CHEMISTRY

BOOKS - PRADEEP CHEMISTRY (HINGLISH)

ORGANIC COMPOUNDS CONTAINING NITROGEN

Curiosity Questions

1. Do you know who produce certain amines? What are they called and what is the fucntion of these amines?

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2. Although some alkaloids are chiefly used as pain killers, all alkaloids are toxic and cause death if taken in large quantities. Name the alkaloid which was used to kill socrates, the great Greek philosopher.

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Test Your Grip Multiple Choice Questions

1. Nitration of nitrobenzene results in

A. o-dinitrobenzene

B. 1,3,5-trinitrobenzene

C. p-dinitrobenzene

D. m-dinitrobenzene

Answer: D

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2. The IUPAC name of the compound $CH_3 - \underset{\underset{H_5C_2}{|}}{N} - \underset{\underset{O}{||}}{C} - CH_3$ is

A. N-Acetyl-N-methylethanamine

B. N-Ethyl-N-methylethanamide

C. N-Acetyl-N-ethylethanamide

D. acetylethylmethylamine

Answer: B

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3. Which of the following reaction will not give primary amine ?

A. $CH_3CONH_2 \xrightarrow{Br_2 / KOH}$

B. $CH_3CN \xrightarrow{LiAlH_4}$

C. $CH_3NC \xrightarrow{LiAlH_4}$

D. $CH_3CONH_2 \xrightarrow{LiAlH_4}$

Answer: C

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4. $C_6H_5CONHCH_3$ can be converted into $C_6H_5CH_2NHCH_3$ by .

A. $NaBH_4$

B. $H_2 - Pd/C$

C. $LIAlH_4$

D. $Zn - Hg/HCl$

Answer: C

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5. $CH_3CH_2Br \xrightarrow[\Delta]{Aq.KOH} A \xrightarrow[\Delta]{KMnO_4/H^+} B \xrightarrow[\Delta]{NH_3} C \xrightarrow[\text{Alkali}]{Br_2} D$, D is

A. CH_3Br

B. CH_3CONH_2

C. CH_3NH_2

D. $CHBr_3$

Answer: C

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6. Amine that cannot be prepared by Gabriel - phthalimide synthesis is:

A. aniline

B. benzylamine

C. methylamine

D. isobutylamine

Answer: A

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7. Choose the incoorect statement

A. Primary amines show intermolecular hydrogen bonds.

B. Tert-Butylamine is a primary amine.

C. Tertiary amines do not show intermolecular hydrogen bonds.

D. Isopropylamine is a secondary amine.

Answer: D

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8. Which of the following is most basic?

A. Benzylamine

B. Aniline

C. Acetanilide

D. p-Nitroaniline

Answer: A

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9. When primary amine reacts with choloroform in ethanolic KOH then the product is:

A. isocyanide

B. aldehyde

C. cyanide

D. alcohol

Answer: B

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10. The amine that reacts with $NaNO_2 + HCl$ to give yellow oily liquid is

A. ethylamine

B. diethylamine

C. isopropylamine

D. secondary butylamine

Answer: B

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11. The major product of the following reaction, $(CH_3)_2CH - \overset{NH_2}{\underset{|}{C}}\ H - CH_3 \xrightarrow{HNO_2}$ is

A. $(CH_3)_2CH - \overset{NOH}{\underset{||}{C}} - CH_3$

B. 

C. $(CH_3)_2CH - \overset{OH}{\underset{|}{C}}\ H - CH_3$

D. $(CH_3)_2CH - \overset{N=NOH}{\underset{|}{C}}\ H - CH_3$

Answer: B

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12. Ethyl amine on heating with CS_2

in presence of $HgCl_2$ forms

A. C_2H_5NCS

B. $(C_2H_5)_2S$

C. $(C_2H_5)_2CS$

D. $C_2H_5(CS)_2$.

Answer: A

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13. When ethylamine is treated with CH_3MgBr, the product is:

A. CH_3CH_3

B. CH_4

C. $CH_3CH_2CH_3$

D. $CH_3CH_2CH_2CH_3$

Answer: B

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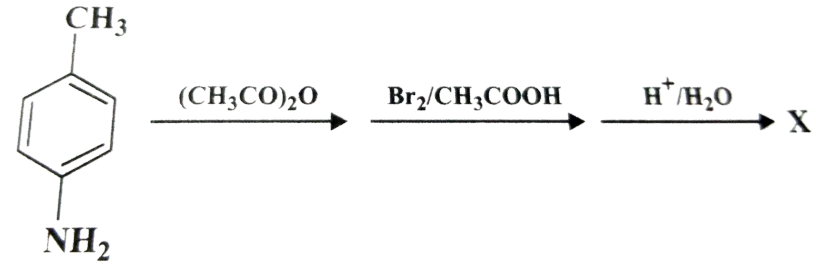
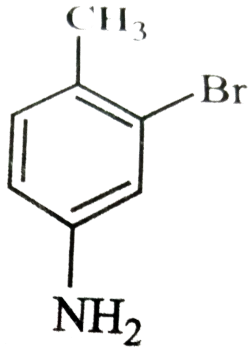
14.



What is X?

A.



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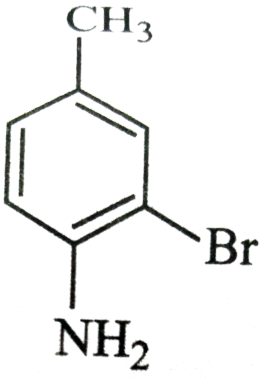
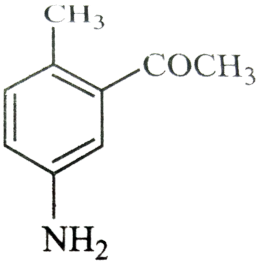
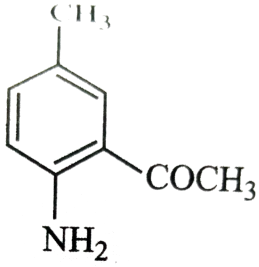


C.



D.



Answer: B

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15. When aniline is heated with conc. H_2SO_4 with 455-475 K, it forms:

A. Aniline hydrogen sulphate

B. m-Aminobenzensulphonic acid

C. Benzenesulphonic acid

D. Sulphanilic acid

Answer: D

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16. Which of the following exists as a zwitterion?

A. p-Aminophenol

B. Salicylic acid

C. Sulphonilic acid

D. p-Aminoacetophenone

Answer: C

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17. Which of the following will not undergo diazotisation?

A. m-Toluidine

B. Aniline

C. p-Aminophenol

D. Benzylamine

Answer: D

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18. Which of the following compound gives dye test ?

A. Aniline

B. Methylamine

C. Diphenylamine

D. Ethylamine

Answer: A

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19. Which of the following will not show coupling reaction with benzenediazonium chloride?

A. Aniline

B. Phenol

C. 2-Naphthol

D. Benzyl alcohol

Answer: D

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20. Which of the following amine does not react with Hinsberg's reagent ?

A. $C_2H_5NH_2$

B. $(C_2H_5)_2NH$

C. $(C_2H_5)_3N$

D. CH_3NH_2

Answer: C

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21. In the following reaction,

$$X \xrightarrow{\text{Bromination}} Y \xrightarrow[HCl]{NaNO_2} Z \xrightarrow[C_2H_5OH]{\text{Boiling}} \text{Tribromobenzene, } X\text{is}$$

A. Benzoic acid

B. Salicylic acid

C. Phenol

D. Aniline.

Answer: D

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22. When benzenediazonium hydrogen sulphate is warmed with methanol, the product formed is

A. benzene

B. benzenol

C. benzyl alcohol

D. anisole

Answer: D

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Test Your Grip Fill In The Blanks

1. The IUPAC name of lowest molecular mass tertiary amine is .....

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2. Ammonolysis of alkyl halides to give amines is an example of____reactions.

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3. Reduction of N-methylacetamide with $LiAlH_4$ in ether gives_____

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4. In Hoffmann bromamide reaction, the carbonyl group is lost as .....

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5. Amine that cannot be prepared by Gabriel phthalimide synthesis is

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6. Acetonitrile on reduction with sodium and C_2H_5OH gives_____.

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7. Reaction of carboxylic acids with hydrazoic acid in presence of conc. H_2SO_4 gives_____with the evolution of CO_2 and ____

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8. Phenyl isocyanide on reduction with hydrogen and Raney nickel gives .....

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9. The reaction of acetone and ammonia in presence of sodium cyanoborohydride gives____

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10. The boiling points of amines are___than those of alcohols of comparable molecular mass due to_____

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11. The basic character of amines is due to the _____.

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12. Benzylamine is__basic than aniline.

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13. Among isomeric o,m-and p-anisidines,____is the weakest base.

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14. Benzenamine reacts with benzoyl chloride in presence of aqueous sodium hydroxide to form____and the reaction is called___reaction.

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15. Secondary amines react with aldehydes and ketones containing α -hydrogen to form .....

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16. Primary amines on heating with chloroform and alcoholic potash give___and the reaction is known as_____.

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17. N-methyl aniline on reaction with nitrous acid gives

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18. Ethyl amine on heating with CS_2

in presence of $HgCl_2$ forms

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19. The reaction of aniline with sodium nitrite and HCl at 293K to form benzenediazonium chloride is called_____

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20. Libermann nitroso reaction is used for the detection of ..... amines.

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21. Tetra-alkyl ammonium salts are called ___salts.

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22. Phenol on treatment with bromine water gives

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23. Nitration of acetanilide with conc $HNO_3 + conc.\ H_2SO_4$ mixture followed by acid hydrolysis mainly gives___.

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24. Ethanamine reacts with benzenesulphonyl chloride to form___which dissolves in___

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25. Carbylamine test is used to test ..... amines.

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26. _____amine does not react with Hinsberg's reagent.

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27. Deamination of arylamines via diazonium salts is best achieved by____

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28. Preparation of chlorobenzene from benzenediazonium chloride with cuprous chloride and aq. HCl is known as____reaction.

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29. Coupling of diazotised _____with___gives methyl orange.

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Conceptual Questions

1. During nitration of benzene with a mixture of concentrated nitric aciid and concentrated sulphuric acid, nitric acid acts as a base. Explain.

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2. Why phenol undergoes electrophilic substitution more easily than benzene?

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3. What is artficial classification ? How is it different from phylognetic classificaiton ?

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4. The presence of a base is needed in the ammonolysis of alkyl halides. Explain.

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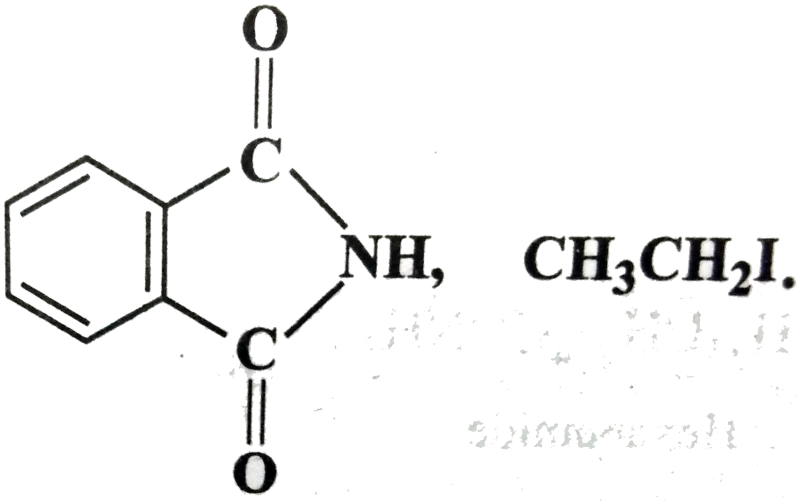
5. Write arrowhead equations for the preparation of $CH_3CH_2NH_2$ from the following substances:

ethanolic KOH,



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6. Amine that cannot be prepared by Gabriel - phthalimide synthesis is:

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7. Arrange the following carbanions in order of their decreasing stability.

A) $H_3C - C \equiv C^-$

B) $H - C \equiv C^-$

C) $H_3C - C\overline{H}_2$

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8. Suggest chemical reactions for the following conversions:

(i) Cyclohexanol $\rightarrow$ Cyclohexylamine,

(ii) 1-Hexanenitrile $\rightarrow$ 1-Aminopentane

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9. Although trimethyl amine and n-propylamine have the same molecular mass, the former boils at a lower temperature (276 K) than the latter (322 K). Why?

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10. Amines are more basic than

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11. Rearrange the following in an increasing order of their basic strenghts

:

$C_6H_5NH_2, C_6H_5N(CH_3)_2, (C_6H_5)_2NH$ and CH_3NH_2

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12. Predict, giving reasons, the order of basicity of the following compounds in gaseous phase,

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

(ii) $C_2H_5NH_2, (C_2H_5)_2NH, (C_2H_5)_3, N, CH_3NH_2$

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13. Why ethanoic KOH and not aqueous

KOH is used in the isocyanide test of aniline?

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

$$CH_3 - Cl \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow{CHCl_3 + alc.\ KOH} C$$

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15. How will you distinguish between $CH3(CH2)3OH$ and $CH3CH = CHCH2OH$ by a chemical test ?

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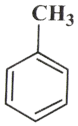
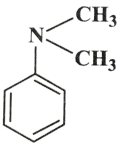
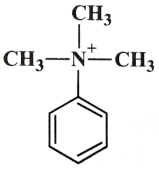
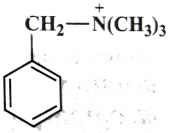
16. Give increasing order towards electrophilic substitution of the following compounds,









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17. Why is it necessary to add gypsum in the final stages of the preparation of cement ?

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

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

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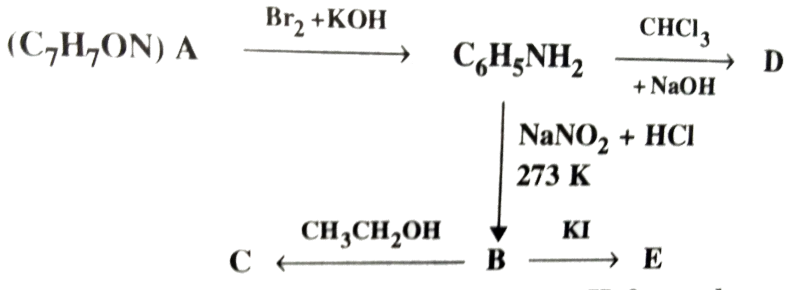
19. An aromatic compound 'A' of molecular formula C_7H_7ON undergoes a series of reactions as shown below. Write the structure of A,B,C,D and E in the following reactions:



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Ncert Questions And Exercises With Answers Ncert Intex Solved Questions

1. Write chemical equations for the following reactions:

(i) Reaction of ethanolic NH_3 with C_2H_5Cl.

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

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2. Write chemical equations for the following conversions:

$(i) CH_3 - CH_2 - Cl \text{into} CH_3 - CH_2CH_2 - NH_2$

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

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3. Write structures and IUPAC names of

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

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

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

$C_6H_5NH_2, C_2H_5NH_2, (C_2H_5)_2NH_3$

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

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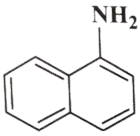
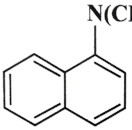
Ncert Questions And Exercises With Answers Ncert Intext Unsolved Questions

1. Classify the following as primary, secondary and tertiary?



(ii)



(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

$Cl-(CH_2)_4-Cl$ 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) $C_2H_5NH_2, (C_2H_5)NH, (C_2H_5)_3N, C_6H_5NH_2$

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

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

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

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

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

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

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9. Convert

(i) 3-Methylaniline into 3-nitrotoluene.

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

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

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

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

$(vii)m-BrC_6H_4NH_2$

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

i. Methylamine and dimethylamine

ii. Secondary and tertiary amines

iii. Ethylamine and aniline

iv. Aniline and benzylamine

v. Aniline and N-methylaniline

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3. Account for the following:

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

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

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

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

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

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

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

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4. Arrange the following:

(i) in decreasing order of pK_a values $C_2H_5NH_2, C_6H_5NHCH_3, (C_2H_5)_2NH$ and $C_6H_5NH_2$.

(ii) in increasing order of basic strength $C_6H_5NH_2, C_6H_5N(CH_3)_2, (C_2H_5)_2NH$ and CH_3NH_2.

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5. How will you convert

(i) Ethanoic acid into methanamine.

(ii) hexanenitrile into 1-aminopentane.

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6. Describe a method for the identification of primary , secondary and tertiary amines . Also write the chemical equations fo the reactions involed .

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7. Write short notes on the following :

i. Carbylamine reaction

ii. Diazotisation

iii . Hofmann bromamide reaction

iv.Coupling reaction

v. Ammonolysis

iv. Acetylation

vii. gabriel phthalimide synthesis

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8. Accomplish the following conversions :

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

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

iv. Chlorobenzen to p-bromoaniline

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

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9. If electronegativity of element A,B,C & D are 1.2, 3, 1.8 & 2.8 respectively then which of the following hydroxide is most basic in nature in aqueous solution:- Question Type: Single Correct Type

(1) A-O-H

(2) B-O-H

(3) C-O-H

(4) D-O-H

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

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11. Complete the following reactions:

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

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

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

(iv) $C_6H_5N_2Cl + C_2H_5OH \rightarrow$

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

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

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

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12. Why cannot be aromatic primary amines prepared by Gabriel pthalimide synthesis ?

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13. Write the reaction of

(i) aromatic and

(ii) aliphatic primary amines with nitrous acid.

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14. Give explanation for each of the following :

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

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

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

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Ncert Exemplanar Problems With Answers Hints And Solutions Mutiple Choice Questions I

1. Which of the following is a 3° amine

A. 1-methylcyclohexylamine

B. Triethylamine

C. tert-butylamine

D. N-methylaniline

Answer: B

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2. The correct IUPAC name for $CH_2 = CHCH_2NHCH_3$ is

A. Allylmethylamine

B. 2-Amino-4-pentene

C. 4-aminopent-1-ene

D. N-methylprop-2-en-1-amine

Answer: D

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3. Amongst the following, the strongest base in aqueous medium is

A. CH_3NH_2

B. $NCCH_2NH_2$

C. $(CH_3)_2NH$

D. $C_6H_5NHCH_3$

Answer: C

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4. Which of the following is the weakest Bronsted base?

A.

B.

C.

D.

Answer:

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5. Benzylamne may be alkylated as shown in the following equation?

$C_6H_5CH_2NH_2 + R - X \rightarrow C_6H_5CH_2NHR$

Which of the followng alkyl haldies is best suited for this reaction through S_N1 mechanism?

A. CH_3Br

B. C_6H_5Br

C. $C_6H_5CH_2Br$

D. C_2H_5Br

Answer: C

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

A. H_2 (excess)/Pt

B. $LiAlH_4$ in ether

C. Fe and HCl

D. Sn and HCl

Answer: B

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7. 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, $C_6H_5(CO)_2N^- + K^+$

Answer: C

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8. The source of nitrogen in Gabriel syntheisis of amine 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

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9. 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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10. The best reagent for converting 2-phenylpropanamide into 2-phenylpropanamine is

A. excess H_2

B. Br_2 in aqueous NaOH

C. iodine in the presence of red phosphorus

D. $LiAlH_4$ in ether

Answer: D

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11. The best reagent for converting, 2-phenylpropanamide into 1-phenylethanemine is....

A. excess H_2 / Pt

B. $NaOH / Br_2$

C. $NaBH_4 /$ methanol

D. $LiAlH_4 /$ Ether

Answer: B

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12. Hofmann's bromamide degradation reaction is shown by

A. $ArNH_2$

B. $ArCONH_2$

C. $ArNO_2$

D. $ArCH_2NH_2$

Answer: B

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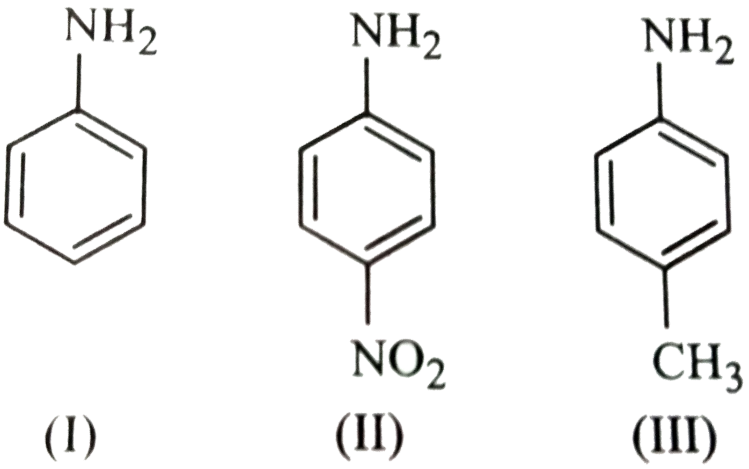
13. The correct increasing order of basic strength for the following compounds is_____



(I) (II) (III)

A. $II < III < I$

B. $III < I < II$

C. $III < II < I$

D. $II < I < III$

Answer: D

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14. Methylamine reacts with HNO_2 to form....

A. $CH_3 - O - N = O$

B. $CH_3 - O - CH_3$

C. CH_3OH

D. CH_3CHO

Answer: C

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15. The gas evolved when methylamine reacts with nitrous acid is

A. NH_3

B. N_2

C. H_2

D. C_2H_6

Answer: B

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16. In the nitration of benzene using a mixture of conc. H_2SO_4 and conc. HNO_3, the species which initiates the reaction is _____.

A. NO_2

B. NO^+

C. NO_2^+

D. NO_2^-

Answer: C

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17. Reduction of aromatic nitro compounds using Fe and HCl gives

A. aromatic oxime

B. aromatic hydrocarbon

C. aromatic primary amine

D. aromatic amide

Answer: C

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18. The most reactive amine towards dilute hydrochloric acid is

A.

B.

C.

D.

Answer:

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19. Acid anhydrides on reaction with primary amine gives...

A. amide

B. imide

C. secondary amide

D. imine

Answer: A

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20. The reaction $Ar\overset{+}{N}_2Cl^- \xrightarrow{Cu/HCl} ArCl + N_2 + CuCl$ is named as _____

A. Sandmeyer reaction

B. Gattermann reaction

C. Claisen reaction

D. Carbylamine reaction

Answer: B

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21. Best method for preparing primary amines from alkyl halides without changing the number of carbon atoms in the chain is

A. Hoffmann bromamide reaction

B. Gabriel phthalimide synthesis

C. Sandmeyer reaction

D. Reaction with NH_3

Answer: B

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22. Which of the following compound will not undergo azo coupling reaction reaction with benzene diazonium chloride.

A. Aniline

B. Phenol

C. Anisole

D. Nitrobenzene

Answer: D

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23. Which of the following compounds is the weakest Bronsted base?

A.

B.

C.

D.

Answer: C

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24. Among the following amines, the strongest Bronsted base is _____.

A.

B.

C.

D.

Answer: D

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25. The correct decreasing order of basic strength of the following species is ..... H_2O, NH_3, OH^-, NH_2^-

A. $NH_2^- > OH^- > NH_3 > H_2O$

B. $OH^- > NH_2^- > H_2O > NH_3$

C. $NH_3 > H_2O > NH_2^- > OH^-$

D. $H_2O > NH_3 > OH^- > NH_2^-$

Answer: A

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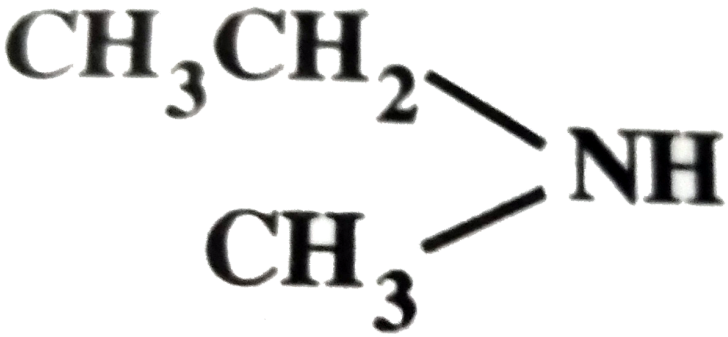
26. Which of the following should be most volatile?

(I) $CH_3CH_2CH_2NH_2$

(II) $(CH_3)_3N$



(III)

(IV) $CH_3CH_2CH_3$

A. II

B. IV

C. I

D. III

Answer: B

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27. Which of the following methods of preparing of amines will give same number of carbon atoms in the chain of amines as in the reactant?

A. Reaction of alkyl nitrile with $LiAlH_4$.

B. Reaction of amide with $LiAlH_4$ followed by treatment with water.

C. heating alkyl halide with potassium salt of phthalimide followed by hydrolysis.

D. Treatment of amide with bromine in aqueous solution of sodium hydroxide.

Answer: D

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Ncert Exemplanar Problems With Answers Hints And Solutions Mutiple Choice Questions Ii

1. Which of the following cannot be prepared by Sandmeyer's reaction?

A. Chlorobenzene

B. Bromobenzene

C. Iodobenzene

D. Fluorobenzene

Answer: C::D

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2. Reduction of nitrobenzene by which of the following reagent gives aniline?

A. Sn/HCl

B. Fe/HCl

C. $H_2 - Pd$

D. Zn / NH_4OH

Answer: A::B::C

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3. Which of the following species are involved in the carbylamine test?

A. $R - NC$

B. $CHCl_3$

C. $COCl_2$

D. $NaNO_2 + HCl$

Answer: A::B::C

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4. The reagents that can be used to convert benzenediazonium chloride to benzene are...

A. $SnCl_2 / HCl$

B. CH_3CH_2OH

C. H_3PO_2

D. $LiAlH_4$

Answer: B::C

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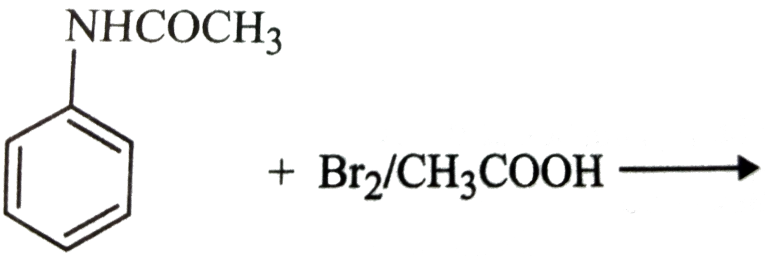
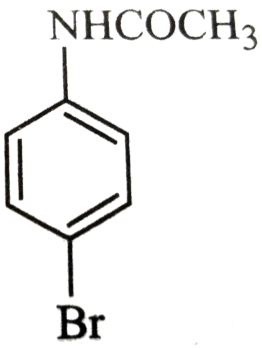
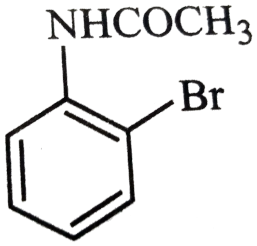
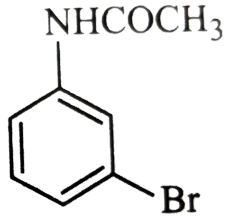
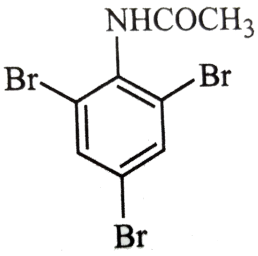
5. The product of the following reaction is_____.



A. 

B. 

C. 

D. 

Answer: A::B::C

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6. Arneium ion involved in the bromination of aniline is....

A.

B.

C.

D.

Answer: A::B::C

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7. 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

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8. Which of the following reactions are correct?

A.

B.

C.

D.

Answer:

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9. Under which of the following reaction condidiotns, aniline give p-nitro derivative as the major product?

A. Acetyl chloride/pyridine followed by reaction with conc. $H_2SO_\$ + conc.\ HNO_3$

B. Acetic anhydride/pyridine followed by conc. $H_2SO_4 + conc.\ HNO_3$.

C. Dil. HCL followed by reaction with conc. $H_2SO_4 + conc.\ HNO_3$

D. Reaction with conc. $HNO_3 + conc.\ H_2SO_4$.

Answer: A::B

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10. Which of the following reaction belong to electrophilic aromatic substitution

A. Bromination of acetanilide

B. Coupling reaction of salts

C. Diazotisation of aniline

D. Acylation of aniline

Answer: A::B

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Ncert Exemplar Problems With Answers Hints And Solutions Short Answer Questions

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

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2. Why is NH_2 group of aniline acetylated before carrying our nitration

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3. What is the product when $C_6H_5CH_2NH_2$ reacts with HNO_3?

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4. What is the best reagent to convert nitrile to primary amine

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5. Give the structure of 'A' in the following reaction < img src="https://d10lpgp6xz60nq.cloudfront.net/physics_images/PR_CHE_V02_XII_C width="80%">

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6. What is Hinsberg reagent?

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

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8. Why does acetylation of - NH_2 group of aniline reduce its activity effect?

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

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10. What is the role of pyridine in the acelation reaction of amines?

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11. Under the reaction condition (acidic, basic) the coupling reaction of aryl diazonium chloride with aniline is carried out?

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12. Predict the product of reaciton for aniline with bromine in non-polar solvent such as CS_2

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13. Arraange the following compounds in increasing order of dipole moment?

$CH_3CH_2CH_3. CH_3CH_2NH_2, CH_3CH_2OH$

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

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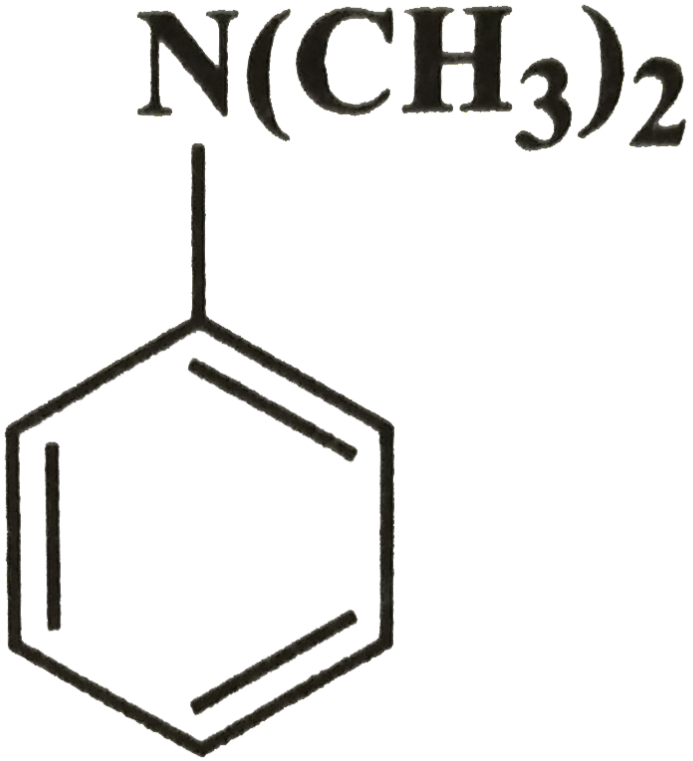
15. Write down the IUPAC name of



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16. 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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17. 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 your suggest a method where RNH_2 forms only 2° amine?

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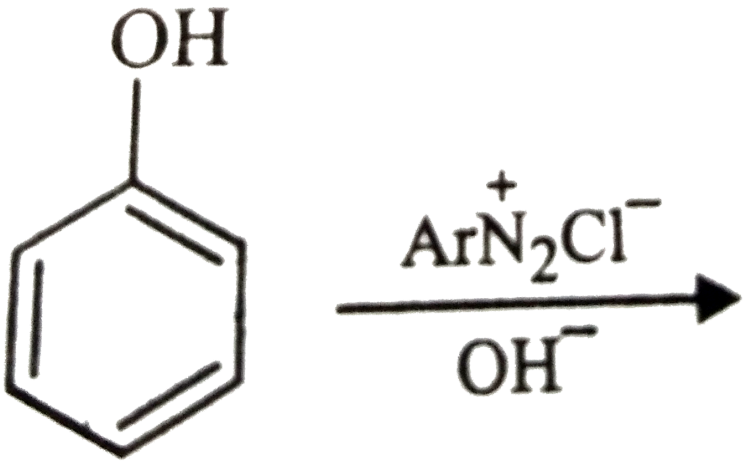
18. Complete the following reaction



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19. Why is aniline soluble in aqueous HCl?

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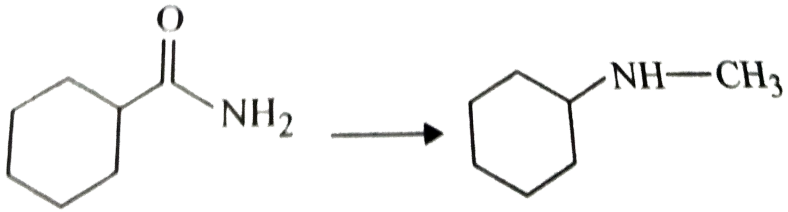
20. Suggest a route by which the following conversion can be accomplished.



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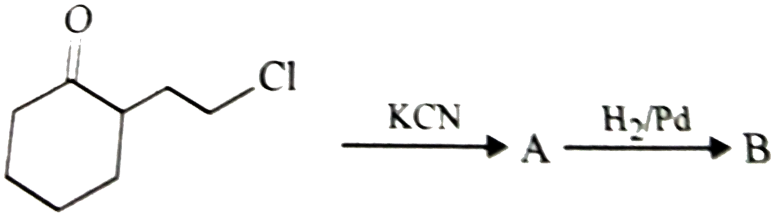
21. Identify A and B in the following reaction.



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22. How will you carry out the follwing conversion?

(i) Toluene -p-toluidine

(ii) p-toluidine diazonium chloride -p-toulic acid

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23. Write following conversions

(i) Nitrobenzene-Acetanilide

(ii) Acetanilide-p-nitroaniline

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24. A solution contains 1g mol. Each of p-toluene diazonium chloride and p-nitrophenyl diazonium cholride. To this 1g mol.of alkaline solution of phenol is added. Predict the major product. Explain your answer.

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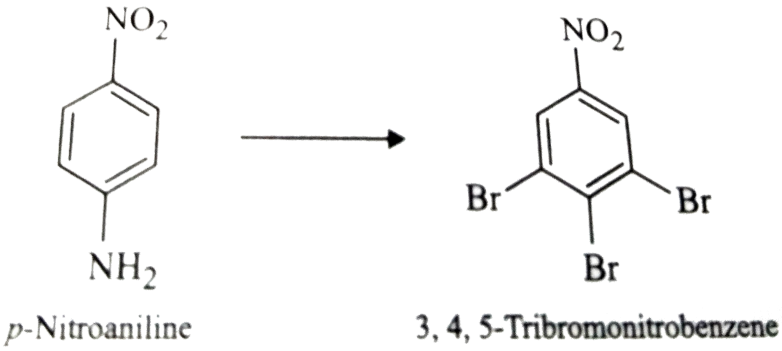
25. How will you bring out the following conversion?



p-Nitroaniline

3, 4, 5-Tribromonitrobenzene

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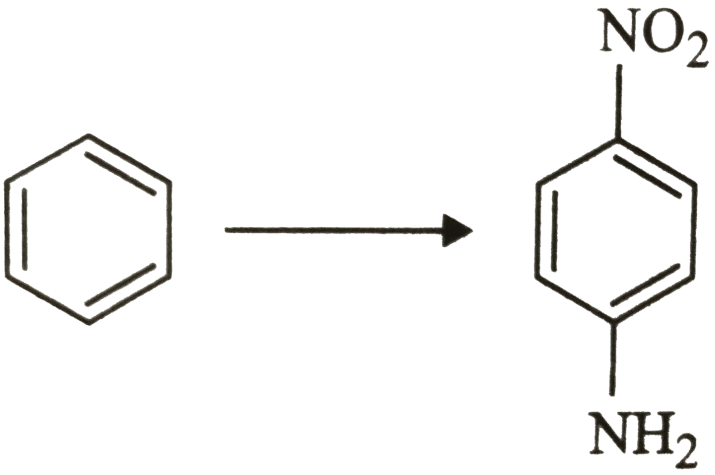
26. How will you carry out the following conversions?



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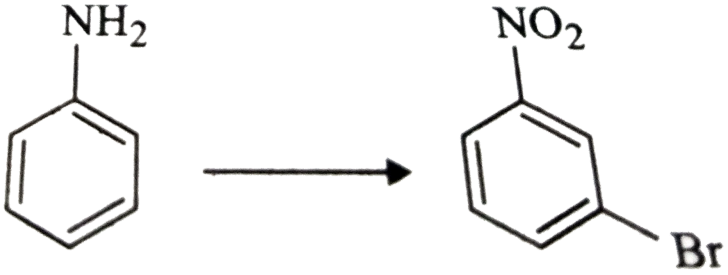
27. How you carry out the following conversion?



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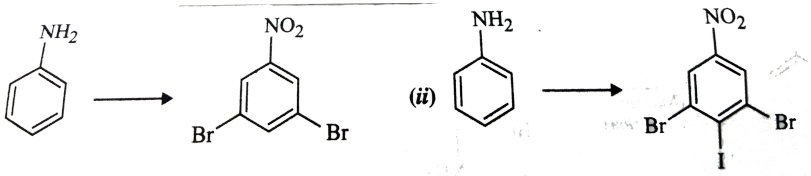
28. How will you carry out the following conversions?



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Ncert Exemplar Problems With Answers Hints And Solutions Matching Type Questions

1. Match the reaction gives in Column I with the statements given in Column II.

Column I	Column II
(i) Ammonolysis	(a) Amine with lesser number of carbon atoms
(ii) Gabriel phthalimide synthesis	(b) Detection test for primary amines
(iii) Hofmann bromamide reaction	(c) Reaction of phthalimide with KOH and R—X
(iv) Carbylamine reaction	(d) Reaction of alkyl halides with NH_3

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2. Match the compounds given in Column I with the items given in column II.

Column I		Column II	
(*i*)	Benzenesulphonyl chloride	(*a*)	Zwitterion
(*ii*)	Sulphanilic acid	(*b*)	Hinsberg reagent
(*iii*)	Alkyldiazonium salts	(*c*)	Dyes
(*iv*)	Aryldiazonium salts	(*d*)	Conversion to alcohols

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Ncert Exemplar Problems With Answers Hints And Solutions Assertion And Reason Type Questions

1. Assertion(A) Acylation of amines gives a monsubstituted product whereas alkulation of amines gives polysubstitues product.

Reason(R) Acyl group sterically hinders the apprach of further acyl group

A. Both assertion and reason are wrong.

B. Both assertion and reason are correct statements but reason is not correct explanation of assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are correct statements and reason is correct explanation of assertion.

Answer: C

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2. Assertion (A): Hofmann's bromamide reaction is given by primary amines.

Reason: Primary amines on more basic than secondary amines.

A. Both assertion and reason are wrong.

B. Both assertion and reason are correct statements but reason is not correct explanation of assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are correct statements and reason is correct explanation of assertion.

Answer: A

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3. Assertion (A): N-ethylbenzene sulphonamide is solube in alkali.

Reason (R): Hydrogen attached to nitrogen In sulphonamide is strongly acidic.

A. Both assertion and reason are wrong.

B. Both assertion and reason are correct statements but reason is not correct explanation of assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are correct statements and reason is correct explanation of assertion.

Answer: D

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4. Assertion(A): N,N-diethylbenzene sulphonamide is insoluble in alkali.

Reason(R): Sulphonyl group attached to nitrogen atoms is strong electron withdrawing group.

A. Both assertion and reason are wrong.

B. Both assertion and reason are correct statements but reason is not correct explanation of assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are correct statements and reason is correct explanation of assertion.

Answer: B

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5. Assertion(A): Only a small amount of HCl is required in the reduction of nitro compound with iron scrap and HCl in the presence of steam.

Reson(R): $FeCl_2$ formed get hydrolysed to release HCl during the reaction.

A. Both assertion and reason are wrong.

B. Both assertion and reason are correct statements but reason is not correct explanation of assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are correct statements and reason is correct explanation of assertion.

Answer: D

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6. Assertion(A): Aromatic 1° amines can be prepared by Gabriel phtalmide synthesis.

Reason (R): Aryl halides undergo nucleophilic substitution with anion formed by pthalimide.

A. Both assertion and reason are wrong.

B. Both assertion and reason are correct statements but reason is not correct explanation of assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are correct statements and reason is correct explanation of assertion.

Answer: A

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7. Assertion(A): Acetanilide is less basic aniline.

Reson(R): Acetylation of aniline results in decrease of electron density on nitrogen.

A. Both assertion and reason are wrong.

B. Both assertion and reason are correct statements but reason is not correct explanation of assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Both assertion and reason are correct statements and reason is correct explanation of assertion.

Answer: D

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Ncert Exemplar Problems With Answers Hints And Solutions Long Answer Questions

1. A hydrocarbon 'A' (C_4H_8) on reaction HCl gives a compound 'B', (C_4H_9Cl) which on reaction with 1 mol of NH_3 gives compounds 'C' $(C_4H_{11}N)$. On reacting with $NaNO_2$ and HCl followed by treatment with water compound 'C' yields an optically active alcohol, 'D'. Ozonolysis of 'A' given 2mols of acetyldehyde. Identify compound 'A' to 'D'. Explain the reaction involved.

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2. A colours substance 'A' (C_6H_7N) is sparingly soluble in water and gives a water soluble compound 'B' on treating with mineral acid. On reaction wih $CHCl_3$ and alcoholic potash 'A' produces an obnoxious smell due to the formation of compound 'C'. Reaction of 'A' with benzensulphonyl chloride gives compound 'D' which is soluble in alkali. WIth $NaNO_2$ and HCl, 'A' forms compound 'E' which reacts with phenol in alkaline medium to give an orange dye 'F'. Identify compounds 'A' to'F'.

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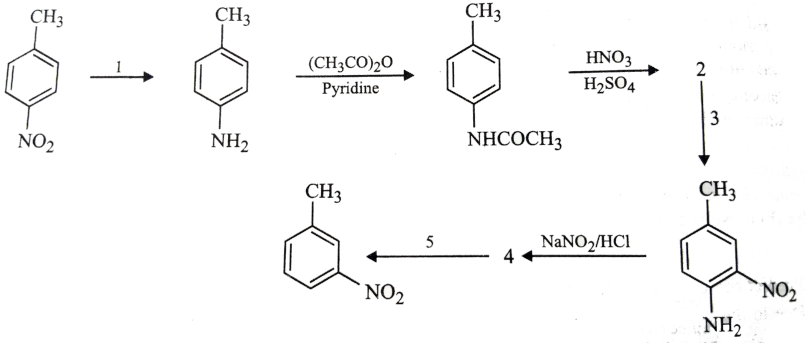
3. Predict the reagent or the product in the followig reaction sequence.



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Additional Questions Very Short Answer Questions

1. How will you convert propanone to propan-2-ol?

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2. What happens when: Aluminium is treated with dilute NaOH

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3. Predict the product of the following reaction

$CH_3NO_2 + C_6H_5CHO \xrightarrow{KOH\,(alc.)}$

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4. What is the baker called?

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5. What are amines?

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6. What are primary amines? Give one example.

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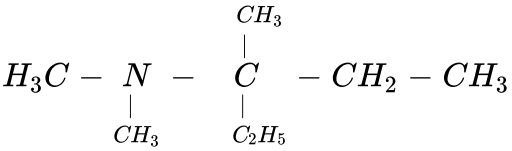
7. Write the IUPAC name of the following compound:



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8. Write the structures of

(i) N-methylethanamine and

(ii) 2-aminotoluene.

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9. Write the IUPAC name of the product formed when nitrobenzene is reduced using tin and concentrated hydrochloric acid.

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10. How will you convert benzene into aniline?

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11. What is ammonolysis?

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12. How will you convert an amide into an amine with the same number of carbon atoms?

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13. How can you convert an amide into an amine having one carbon atom less than the starting compound?

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14. Give the IUPAC name and structure of the amine obtained when 3-chlorobutanamide undergoes Hoffmann- bromamide reaction.

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15. Identify A and B in the following sequence of reactions:

$CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B.$

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16. Write the main product of the following reactions:

(i) $CH_3 - \underset{\underset{O}{||}}{C} - NH_2 \xrightarrow{Br_2 + NaOH}$

(ii) $CH_3CN \xrightarrow{LiAlH_4}$

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17. Give the structures of A, B and C in the following reaction :

$CH_3Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[273K]{HNO_2} C.$

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18. How is aminoethane (ethylamine) obtained from ethanal (acetaldehdye)?

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19. (a) How will you convert an alkyl halide into a primary amine having one more carbon atom than the alkyl halide used ?

(b) How can a carboxylic acid be converted into an amine having one less carbon atom than the carboxylic acid used ?

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20. How will you obtain the following from methyl isocyanide?

(i) dimethylamine (ii) Methyl isothiocyanate

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21. Arrange the following increasing order of their boiling point:

$C_4H_9 - NH_2, (C_2H_5)_2NH, C_2H_5N(CH_3)_2.$

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22. (a) Arrange the following in the increasing order of boiling points:

$C_2H_5NH_2, C_2H_5OH, (CH_3)_3N$

(b) Arrange the following in increasing order of base strength in gas phase:

$(C_2H_5)_3N, C_2H_5NH_2, (C_2H_5)_2 2NH$

(c) Arrange the following in decreasing order of solubility in water:

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

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23. Account for the following

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

(ii) Aniline does not undergo friedel - crafts reaction

(iii) $(CH_3)_2$ NH is more basic than $(CH_3)_3N$ in an aquaous solution

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24. Methylamine is soluble in water but not aniline. Explain.

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25. Arrange the following compunds in increasing order of solubility in water:

$C_6H_5NH_2, (C_2H_5)_2NH, C_2H_5NH_2$

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26. What amine salts are used for determining their molecular masses?

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27. Why is carbon nitrogen bond length in aromatic amines shorter than in aliphatic amines?

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28. Why is an alkylamine more basic than ammonia ?

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29. Which is more acidic (or basic), aniline or ammonia?

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30. Arrange the following in decreasing order of their basic strength: ammonia, triethylamine, aniline, ethylamine and diethylamine.

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

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32. Arrange the following in the increasing order of their basicities.

(I) $p-$ Toluidine

(II) $N, N-$ Dimethyl-p-toluidine

(III) $p-$ Nitroaniline`

(IV) Aniline.

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33. Arrange the following in increasing order of their acid strength: methylamine, dimethylamine, aniline, N-methylaniline.

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34. CH_3CONH_2 is a weaker base than $CH_3CH_2NH_2$.

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

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

(ii) $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow{NaOH + Br_2} B \xrightarrow{CHCl_3 + alcKOH} C$

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36. How will you canvert the following :

(i) Nitrobenzene into aniline,

(ii) Ethanoic acid into methanmine

(iii) Aniline into N-phenylethanaminde (write the chemical equations involved).

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37. The product of mustard oil reaction is

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38. Give a chemical test to distinguish between a primary and a secondary amine.

Watch Video Solution

39. Electrophilic substitution in case of aromatic amines takes place more readily than benzene. Explain.

Watch Video Solution

40. Direct nitration of aniline is not carried out. Explain.

Watch Video Solution

41. Give reason: Aniline gets coloured on standing in air for a long time.

Watch Video Solution

42. Which of the following exists as a zwitterion?

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43. Mention two important uses of sulphanilic acid.

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44. Statement 1: Primary, secondary and tertiary amines can be separated by Hinsburg reagent and

Statement 2: These amines have different rate of reaction with benzens sulfonyl chloride.

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45. Compound A (C_3H_9N) reacts with benzene sulphonyl chloride to form a solid insoluble in alkali. The structure of compound A is

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46. Metntion the chief use of quaternary ammonium salts derived from long chain amines. Or what for are quaternary ammonium salts widely used?

View Text Solution

47. What is diazotisation

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48. Write the structure of benzenediazonium chloride?

Watch Video Solution

49. Why are benzenediazonium salts soluble in water?

Watch Video Solution

50. What is Sandmeyer reaction?

Watch Video Solution

51. (a) Explain why an alkylamine is more basic than ammonia?

(b) How would you convert:

(i) Aniline to nitrobenzene

(ii) Aniline to iodobenzene

Watch Video Solution

52. Explain the following reactions by giving one example :

(i) Carbylamine reaction (ii) Sandmeyer's reaction

(iii) Balz-Schiemann reaction

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53. What are the reaction involved in the reductive removal of nitro group from an aromatic compound?

Watch Video Solution

54. How will you convert aniline into nitrobenzene without the intermediacy of benzene?

Watch Video Solution

55. What is a coupling reaction?

Watch Video Solution

56. What product is formed when aniline is first diazotised and then reacted with phenol in the alkaline medium?

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57. Give an example of Gomberg reaction.

Watch Video Solution

58. How is phenylhydrazine prepared from aniline?

Watch Video Solution

59. Name reagents required for preparation of methyl orange indicator (no reaction).

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Additional Questions Short Answer Questions

1. What are nitroalkanes? How are they classifies?

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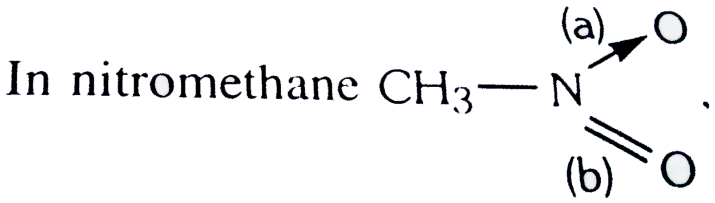
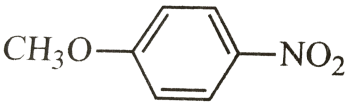
2. In nitromethane



two N-O bond lengths are :

Watch Video Solution

3. (a) Give the IUPAC names of the following compounds:

(i). 

(*ii*) $C_6H_5CH = CHNO_2$

(b) Write the full name of T.N.T. and its structural formula.

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4. How are nitroalkanes prepared from

(i) alkyl halides

(ii) alkanes?

Watch Video Solution

5. How is benzene converted into nitrobenzene ? Discuss the mechanism of this reaction.

Watch Video Solution

6. Explain the mechanism of nitration of benzene.

Watch Video Solution

7. What happens when:

(i) Toluene is treated with conc. HNO_3 and conc. H_2SO_4 at 293.

(ii) Nitrobenzene is treated with conc. HNO_3 and H_2SO_4 at 363 K.

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8. Explain the following:

(i) Boiling points of nitroalkanes are much higher than those of hydrocarbons of comparable molecular masses.

(ii) Boiling points of nitroalkanes are higher than those of isomeric alkyl nitrites.

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9. REDUCTION OF NITRO COMPOUNDS

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10. "Reduction of nitrobenzene depends upon pH". Explain.

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11. REDUCTION OF NITRO COMPOUNDS

Watch Video Solution

12. What happens when nitrobenzene is reduced with zinc dust in (i) aqueous ammonium chloride, (ii) aqueous sodium hydroxide and (iii) methanolic sodium hydroxide?

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13. What is the action of nitrous acid on :

(a) Primary nitroalkane

(b) Secondary nitroalkane

(c) Tertiary nitroalkane

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14. Explain why nitrobenzene undergoes electrophilic substitution at m-position and nucleophilic substitution at o- and p-positions?

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15. Comment upon the acidic nature of hydrogen atoms of nitroethane. How does nitroethane react with (i) acetaldehyde nd (ii) benzaldehyde?

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16. Explain why the hydrogen atoms of the methyl group in o- and p-nitrotoluenes are acidic in nature while those of toluene are not.

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17. Give two uses of nitro compounds.

Watch Video Solution

18. What are primary, secondary are tertiary amines? Give one example of each.

Watch Video Solution

19. The modified stem in grasses, strawberry Chrysanthemum is concerned with special functie i.e., br i-Food storage ,br ii- Vegetative propagation, br iii- Assimilation, br iv- Spread to new niches, br v- Perennation,

Watch Video Solution

20. How will you prepare ethylamine from each of the following

(i) Ethyl bromide

(ii) Methyl cyanide

(iii) Propionamide

(iv) Acetamide.

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Watch Video Solution

21. How will you prepare ethylamine by using Hofmann bromamide reaction? Or write chemical equations to prepare ethanamine from propanamide.

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22. How is ethylamine prepared from acetonitrile? Compare its basic character with that of ammonia?

Watch Video Solution

23. How are amines prepared from (a) amides (b) oximes and (c) aldehydes.

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24. Write balanced chemical equation for the preparation of methylamine from acetamide.

Watch Video Solution

25. Write the IUPAC name of diethylamine. How will you obtain it from nitroethane?

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26. Why is it difficult to prepare pure amines by ammonolysis of alkyl halides?

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27. Give explanation for each of the following :

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

masses ?

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

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

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28. Methyl or ethylamine is soluble in water but aniline is insoluble. Explain.

Watch Video Solution

29. Account for the following:

(i) Secondary amines are more basic than primary amines.

(ii) Primary amines are more basic than ammonia.

(iii) Arylamines are weaker bases than alkylamines or vice-versa.

(iv) Alkylamines are stronger bases than arylamines.

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30. Why are aromatic amines weaker bases than aliphatic amines? Or pK_b of aniline is more than that of methylamine. Explain.

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31. Explain K_b order : $Et_2NH > Et_3N > EtNH_2$ in aqueous solution.

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32. Explain the observed K_b order: $Me_2NH > MeNH_2 > MeN$

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33. In the following cases rearrange the compounds as directed:

(i) In an increasing order of basic strength:

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

(ii) In a decreasing order of basic strength:

Aniline, p-nitroaniline and p-toluidine

(iii) In an increasing order of pK_b values:

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

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34. Justify the order of basicity of $EtNH_2$, Et_2NH and Et_3N.

Watch Video Solution

35. What is the decreasing order of basicity of $1^\circ 2^\circ$ and 3° ethy1 amines and ammonia ?

Watch Video Solution

36. Why is ethylamine more basic than aniline? Explain.

Watch Video Solution

37. Give reason: Aniline is a weaker base than cyclohexylamine.

Watch Video Solution

38. Explain why aromatic amines are less basic than ammonia and aliphatic amines.

Watch Video Solution

39. Aniline is less/more basic than ethylamine.

Watch Video Solution

40. Explain the following

(i) A little acid is always added in the preparation of aqeous ferrous sulphate solution

(ii) Aqueous solution of mercuric chloride and stannous chloride cannot

exist together .

(ii) Ferric iodide is very unstable but ferric chloride is not.

(iv) Hg^{2+} and Hg_2^{2+} salts are colourless generaly .

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41. What is quaternary ammoniu salt? What happens when triethylamine is heated with ethyl chloride?

Watch Video Solution

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

Watch Video Solution

43. Tertiary amines do not undergo acylation. Explain.

Watch Video Solution

44. What is carbylamine test for 1° amines?

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45. Chloroform when treated with aniline and alcoholic KOH forms -

Watch Video Solution

46. Give equations for the reactions that occurs when:

(i) Methylamine reacts with acetyl chloride.

(ii) aniline is treated with $CHCl_3$ and KOH solution.

Watch Video Solution

47. Electrophilic substitution in case of aromatic amines takes place more readily than benzene. Explain.

Watch Video Solution

48. Aniline undergoes electrophilic substitution reactions at ortho-and para-position only.

Watch Video Solution

49. Electrophilic substitution in case of aromatic amines takes place more readily than benzene. Explain.

Watch Video Solution

50. Account for the following:

(i) Aniline is acetylated to prepare its monobromo derivative.

(ii) Before nitration, aniline is converted into aceanilide.

or Before reacting aniline with HNO_3 for nitration, it is converted into acetanilide. why is it done and how is nitroaniline obtained subsequently?

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51. How will you obtain the following from aniline? Give equations only.

(i). 2,4,6-Tribromoaniline

(ii) Benzenediazonium chloride

(iii) Sulphanilic acid

(iv) p-Benzoquinone.

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52. (a) Write complete chemical reactions for the conversion of aniline into sulphanilic acid.

(b). Mention two important uses of sulphanilic acid.

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53. How will you convert?

(i) Propene to 1-nitropane

(ii) n-Propyl chloride into n-propylamine.

(iii) Methylamine into ethylamine.

(iv) Nitrobenzene into aniline.

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54. Complete the following reaction:

(i) $C_6H_5NH_2 + HCl(aq)$

(ii) $CH_2H_5NH_2 + C_6H_5SO_2Cl \rightarrow$

(iii) $C_2H_5NH_2 + HNO_2 \rightarrow$

(iv) $C_6H_5NH_2 + Br_2(aq) \rightarrow .$

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55. Identify the compounds A,B and C in the following reactions.

(i) $C_6H_5NH_2 \xrightarrow[273-278K]{NaNO_2, HCl} A \xrightarrow{CuBr/HBr} B$

(ii) $C_6H_6 \xrightarrow[<333K]{conc.HNO_3, conc.H_2SO_4} A \xrightarrow{H_2/Ni} B$

(iii) $C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow[273-278K]{NaNO_2/HCl}$

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

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56. The test to distinguish primary, secondary and tertiary amine is

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57. How will you separate a mixture of primary and secondary amines?

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58. What is Hinsberg's reagent ?

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59. Describe a method for the identification of primary , secondary and tertiary amines . Also write the chemical equations fo the reactions involed .

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60. Give chemical tests to distinguish between the following compounds (one test in each case):

(i) Aniline and ethylamine

(ii) Aniline and N-ethylaniline

(iii) Methylamine and dimethylamine

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61. Explain why arenediazonium salts are much more stable than alkanediazonium salts.

Watch Video Solution

62. What is diazotisation? Discuss its mechanism.

Watch Video Solution

63. Why is it difficult to carry out the diazotisation of aniline in which electron withdrawing group is present on the ring at the para-position?

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64. Write down diazotisation reaction.

Watch Video Solution

65. Starting from benzenediazonium chloride, how will you prepare the following compounds:

(i) Iodobenzene,

(ii) Benzene

(iii) Phenol?

Watch Video Solution

66. How can you get benzonitrile from aniline?

Watch Video Solution

67. Why does benzenediazonium chloride react with aniline in weakly acidic medium?

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68. Give one reaction of a diazonium salt in which (i) diazo group is removed (ii) diazo group is retained.

Watch Video Solution

69. Give a brief account of Sandmeyer reaction. In what respect, does it differ from Gattermann reaction?

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70. Importance of pH|Salts

Watch Video Solution

71. How will you prepare

(i) o-Chlorobenzoic acid from o-aminobenzoic acid.

(ii) Benzylamine from benzenediazonium chloride.

(iii) m-Bromotoluene from toluene?

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72. (a) How does benzenediazonium chloride react with

(i) Hypophosphorus acid

(ii) Copper cyanide?

(b) Identify A and B in the following reaction sequences:

(i) $C_6H_5N_2Cl \xrightarrow[\Delta]{+H_2O} A \xrightarrow[water]{Br_2} B$

(ii) $C_6H_5NH_2 under st(273-278K) \xrightarrow{NaNO_2, HCl} A \xrightarrow{CuBr/HBr} B$

Watch Video Solution

73. Complete the following reactions.

(i) $C_6H_5N_2Cl + C_6H_5NH_2 \xrightarrow[pH4-5]{\text{Ice cold}}$

(ii) $C_6H_5N_2Cl + H_2O \xrightarrow{\text{warm}}$

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74. Write giving chemical equations for each of the following reactions:

(i) Hofmann bromamide reaction.

(ii) Carbylamine reaction.

(iii) Gabriel phthalimide reaction.

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75. How will you convert?

(i) Aniline to nitrobenzene

(ii) Aniline to iodobenzene.

(iii) Nitrobenzene to benzenediazonium chloride.

(iv) Anilnie to benzyl alcohol.

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76. How will you convert p-toluidine to 2-bromo-4-methylaniline?

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77. How will you convert aniline into fluorobenzene?

Watch Video Solution

78. Write the structure of methyl orange. Give its synthesis.

Watch Video Solution

79. How will you convert nitrobenzene into

(i) p-Hydroxyazobenzene

(ii) Iodobenzene

(iii) Bromobenzene

(iv) chloroenzene

(v) Phenol

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Additional Questions Long Answer Questions

1. Discuss the mechanism of benzene. Explain why does nitrobenzene undergo electrophilic substitution at m-position and nucleophilic substitution at o- and p-position.

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2. The different behaviour of nitrous acid with $1^{\circ}, 2^{\circ}$ and 3° nitroalkanes forms the bases of:

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3. Why are amines basic ? Compare the basic strength of ammonia, ethylamine, diethylamine and triethylamine.

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4. How many isomer are possible for a substance having the molecular formula, C_3H_9N? Write their structural formulae and illustrate by chemical reactions how each one of these reacts with the following:

(i) Nitrous acid

(ii) Acetyl chloride.

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5. Write the structures of primary, secondary and tertiary amines having the molecular formula C_3H_9N. How can these be distinguished from one another?

Watch Video Solution

6. What are diazonium salts? How is benzenediazonium chloride prepared from aniline? Discuss briefly its synthesis applications.

Watch Video Solution

7. How is benzenediazonium chloride prepared in solution? Give an account of its coupling reaction with phenols and amines.

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Higher Order Thinking Skills Hots Questions

1. How is 2,4-dinitrophenylhydrazine prepared from chlorobenzene?

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2. How will you convert toluene into sym-trinitrobenzene?

Watch Video Solution

3. tert-Butylamine cannot be prepared by action of ammonia on tert-butyl bromide. Why? Explain.

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4. Why is an amide more acidic than amine?

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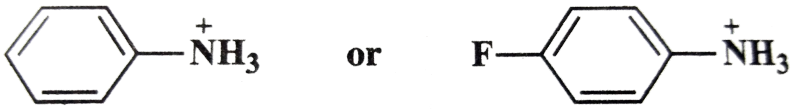
5. Which one is more acidic ? Explain.



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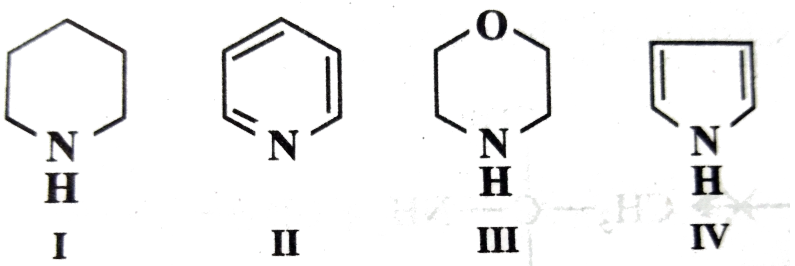
6. Arrange the following amines in order of decreasing basicity:



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7. Why does bromination of aniline, even under very mild conditions, gives 2,4,6-tribromoaniline instantanesouly?

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Higher Order Thinking Skills Hots Problems

1. A compound (A) of boron reacts with Nme_3 to give an adduct (B) which on hydrolysis gives a compound (C) and hydrogen gas. Compound (C) is an acid. Identify the compounds A,B and C. give the reactions inovolved.

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2. $\underset{\text{Optically active}}{\underset{(X)}{C_5CH_{13}N}} \xrightarrow[N_2]{NaNO_2/HCl} (Y)\text{Tertiary alcohol} + \text{Other product}$

Find (X) and (Y) . Is (Y) optically active ? Write the intermediate steps .

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Value Based Questions With Answers

1. First read a passage and then answer the questions following that passage.

How can you improve your reading speed ? By taking off the brakes. You wouldn't think of driving a car with the brake on. Yet as a reader you probably have several brakes slowing you down. One very common brake is regressing-looking back every now and then at something already read. It is like stepping backwards every few metres as you walk-hardly the way to move ahead quickly. Regression may arise from a lack of confidence, vocabulary deficiency, or actually missing a word or phrase. It makes a long sentence seem even more complex as the eyes frequently regress. Eye movement photographs of 12,000 readers in America showed that university students regress an average of 15 times in reading only 100 words. The average student of class four was found to look back 20 times. In short, regression consumes one-sixth of your precious reading time. Release this brake and enjoy a spurt in reading speed.

In order to be a good reader you should

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2. Puberty is the period in life at which sexually immature boy or girl becomes sexually mature and capable of reproduction. It happens to be at the age of 11 to 13 years in girls and 13 to 16 years in boys. However, the period may vary from person to person. Puberty ends when an adolescent reaches the reproductive maturity. At puberty, certain changes occur both in boys and girls. Some changes are common in girls and boys such as increase in height, changes in body shape, changes in voice box and voice, etc.

Which of the following statements are correct?

(I) Girls have a high pitched voice.

(II) Salivary glands are ductless glands.

(III) All body parts do not grow at the same rate.

(IV) At puberty, no increase in height takes place.

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3. When an primary aromatic amine is treated with $NaNO_2 + HCI$ at $0^\circ - 5^\circ C$, a diazonium salt is formed and the reaction is called diazo

reaction. In this reaction mineral acid must be added to prevent the coulping reaction of diazonium salt with excess of aryl amine. diazonium salt is highly in the synthesis of number of coloured dyes.

When 2,4-dinitrophenol react with $NaNO_2 + HCI$ at $5^\circ C$ followed by reaction with anisole, a coloured compound is formed which can be given as:

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Competition Focus Jee Main And Advanced Medical Entrance Special Multiple Choice Questions I

1. Nitrobenzene on reaction with conc HNO_3 / H_2SO_4 at $80 - 100^\circ C$ forms which one of the following products .

A. 1,4-Dinitrobenzene

B. 1,2,4-Trinitrobenzene

C. 1,2-Dinitrobenzene

D. 1,3-Dinitrobenzene

Answer: D

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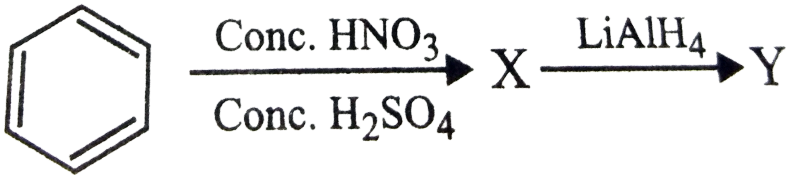
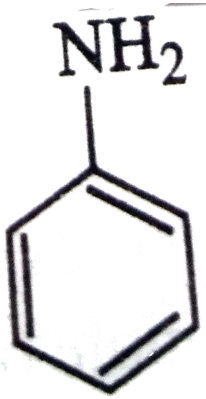
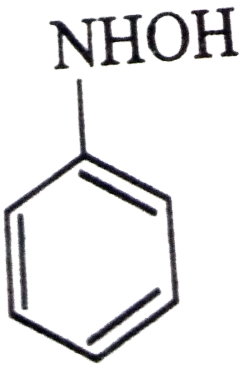
2. The product 'Y' in the following reaction sequence is

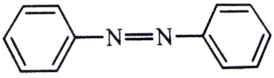


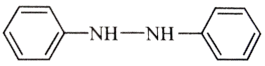
A.



B.



C. 

D. 

Answer: C

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3. The electrolytic reduction of nitrobenzene in strongly acidic medium produces .

A. azobenzene

B. aniline

C. p-aminophenol

D. azoxybenzene

Answer: C

Watch Video Solution

4. Which one of the following nitro-compounds does not react with nitrous acid?

A.

B.

C.

D.

Answer: C

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5. Which of the following compounds will not undergo Friedel – Crafts reaction easily ?

A. Nitrobenzene

B. Toluene

C. Cumene

D. Xylene

Answer: A

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6. The number of structure isomers possible from the molecular formula C_3H_9N is:

A. 5

B. 2

C. 3

D. 4

Answer: D

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7. The total number of structural isomers possible for an amine with molecular formula $C_4H_{11}N$ is

A. 6

B. 5

C. 7

D. 8

Answer: D

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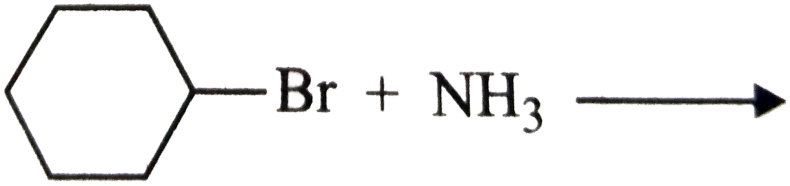
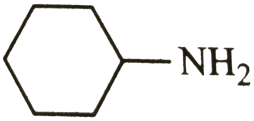
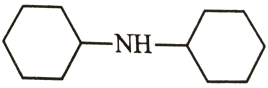
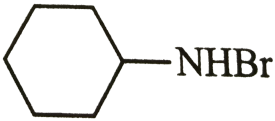
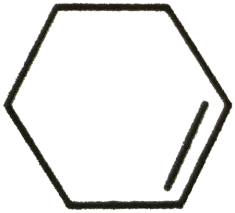
8. Identify the product of the following reaction:



A. 

B. 

C. 

D. 

Answer: D

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9. In the given set of reactions :

$$2-\text{Bromopropane} \xrightarrow[\Delta]{\text{alc.AgCN}} 'X' \xrightarrow{LiAlH_4} 'Y'$$

The IUPAC name of product 'Y' is :

A. N-isopropylmethanamine

B. N-methylpropan-2-amine

C. N-methylpropanamine

D. butan-2-amine

Answer: B

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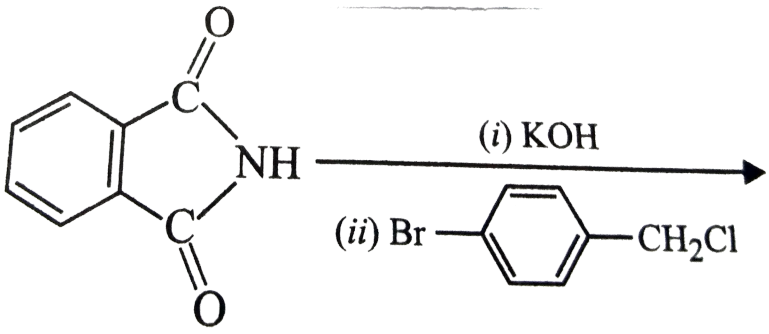
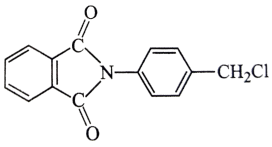
10. The major product of the following reaction is



A.

B.



C. 

D. 

Answer: A

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11. Method by which aniline cannot be prepared is:

A. degradation of benzamide with bromine in alkaline solution

B. reduction of nitrobenzene with H_2 / Pd in ethanol

C. potassium salt of phthalimide treated with chlorobenzene followed by hydrolysis with aaqueous NaOH solution.

D. hydrolysis of phenylisocyanide with acidic.

Answer: C

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12. Which one of the following can be prepared by Gabriel phthalimide synthesis?

A. Aniline

B. o-Toluidine

C. 4-Bromoaniline

D. N-Methylethanamine.

Answer: C

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13. Acetamide is treated with the following reagents seprately.Which one of these would yield methyl amine?

A. PCl_5

B. $NaOH - Br_2$

C. Sodalime

D. Hot. Conc. H_2SO_4

Answer: B

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14. In the hofmann-bromamide degradation reaction, the number of moles of NaOH and Br_2 used per mole of amine produced are

A. one mole of NaOH and one mole of Br_2

B. four moles of NaOH and two moles Br_2

C. two moles of NaOH and two moles of Br_2

D. four moles of NaOH and one mole of Br_2

Answer: D

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15. Which of the following amides will not undergo Hofmann bromamide reaction?

A. $CH_3CONHCH_3$

B. $CH_3CH_2CONH_2$

C. CH_3CONH_2

D. $C_6H_5CONH_2$

Answer: A

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16. An organic compound A upon reacting with NH_3 gives B. On heating B give C. C in presence KOH reacts with Br_2 to yield $CH_3CH_2NH_2A$ is

A. CH_3CH_2COOH

B. CH_3COOH

C. $CH_3CH_2CH_2COOH$

D. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - COOH$

Answer: A

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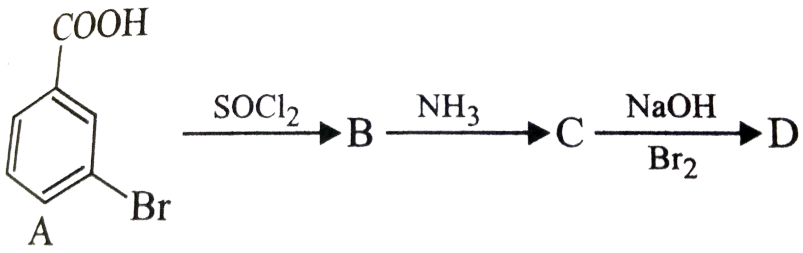
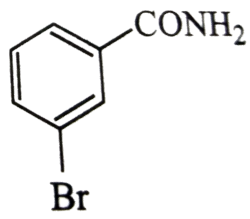
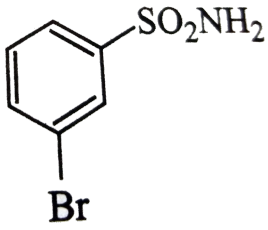
17. In a set of reactions, m-bromobenzoic acid gave a product D. identify the product D.



A. 

B. 

C. 

D. 

Answer: D

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18. m- bromoaniline can be prepared by .

A. $C_6H_6 \xrightarrow[H_2SO_4]{HNO_3} \xrightarrow[2.NaOH, H_2O]{Sn-HCl} \xrightarrow[H_2O]{Br_2}$

B. $C_6H_6 \xrightarrow[FeBr_3]{Br_2} \xrightarrow[H_2SO_4]{HNO_3} \xrightarrow[Pt]{H_2}$

C. $m-BrC_6H_4COOH \xrightarrow{SOCl_2} \xrightarrow{NH_3} \xrightarrow{Br_2, NaOH}$

D. $C_6H_5NH_2 \xrightarrow[Cu_2Br_2]{NaNO_2, HCl} \xrightarrow{SOCl_2} \xrightarrow{NaNH_2}$

Answer: C

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19. 

In the above sequence, II is

A. β-alanine

B. α-alanine

C. ethylenediamine

D. γ-aminobutyric acid

Answer: A

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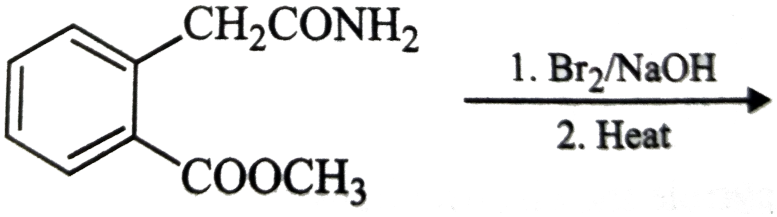
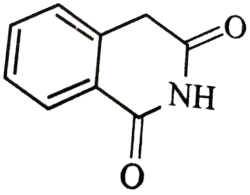
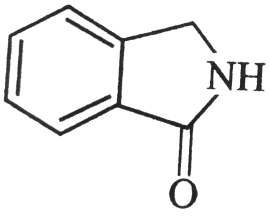
20. The following sequence of reactions on A gives



A. 

B. 

C. 

D. 

Answer: C

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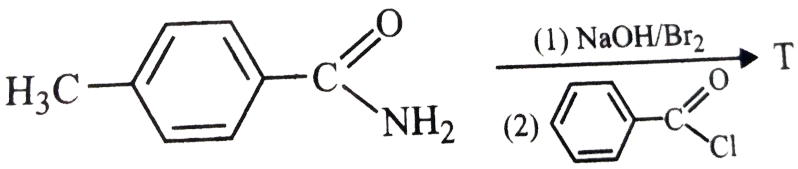
21. In the reaction

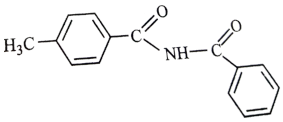


the structure of the product T is

A. 

B. 

C. 

D. 

Answer: C

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22. In the following sequence of reaction, what is D?

A. Primary amines show intermolecular hydrogen bonds.

B. An amide

C. Phenyl isocyanate

D. Chain lenghened hydrocarbon

Answer: C

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23. N-butylamine (I), diethylamine (II) and N,N-dimethyl ethylamine(III) have the same molar mass. The increasing order of their boiling point is:

A. $III < II < I$

B. $I < II < III$

C. $II < III < I$

D. $II < I < III$

Answer: A

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24. Arrange the following in increasing order of their basic strength $CH_3NH_2(I), (CH_2NH(II), (CH_3)_3N(III), C_6H_5CH_2NH_2(IV)$.

A. $IV < III < II < I$

B. $IV < III < I < II$

C. $I < II < III < IV$

D. $IV < I < II < III$

Answer: B

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25. Which of the following shows the correct order of decreasing basicity in gas phase?

A. $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$

B. $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$

C. $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2 > NH_3$

D. $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH > NH_3$

Answer: B

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26. The correct statement regarding the basicity of arylamines is .

A. arylamines are generally more basic than alkylamines because of aryl group

B. arylamines are generally more basic than alkylamines because the nitrogen atom in arylamines is sp-hybridised

C. arylamines are generally less basic than alkylamines because the nitrogen lone-pair electrons are delocalised by interaction with the aromatic ring π-electron system

D. arylamines are generally more basic than alkylamines because the nitrogen lone-pair electrons are not delocalised by interaction with the aromatic ring π-electron system.

Answer: C

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27. Considering the basic strength of amines in aqueous solution, which one has the smallest pK_b value?

A. $C_6H_5NH_2$

B. $(CH_3)_2NH$

C. CH_3NH_2

D. $(CH_3)_3N$

Answer: B

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28. Which of the following compounds is most basic?

A.

B.

C.

D.

Answer: B

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

A. N,N-diethylethanamine

B. N-ethylethanamine

C. N-methylmethanamine

D. phenylmethanamine

Answer: B

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30. Strongest base is

A. $C_6H_5NH_2$

B. $CH_2 = CHCH_2NH_2$

C. $HC \equiv CCH_2NH_2$

D. $CH_3CH_2CH_2NH_2$

Answer: D

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31. Among the following amines, the strongest Bronsted base is....

A.

B.

C.

D.

Answer: B

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32. Basicity of $CH_3CH_2NH_2(I), CH_3CONH_2(II)$ and $C_6H_5CONH_2(III)$ follows the order:

A. $I > II > III$

B. $I > III > II$

C. $II > III > I$

D. $III > II > I$

Answer: B

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33. Which among the following is the strongest acid ?

A.

B.

C.

D.

Answer: B

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34. Among the following dissocitation constant is highest for .

A. C_6H_5OH

B. $C_6H_5CH_2OH$

C. $CH_3C \equiv CH$

D. $CH_3NH_3^+Cl^-$

Answer: D

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35. In pyrrole the electron density is maximum on

A. 2 and 3

B. 3 and 4

C. 2 and 4

D. 2 and 5

Answer: D

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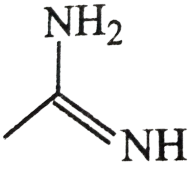
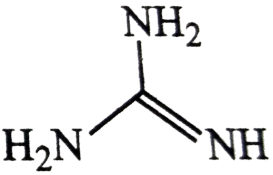
36. The correct order of basicity of the following

1. 

2. 

3. 

4. 

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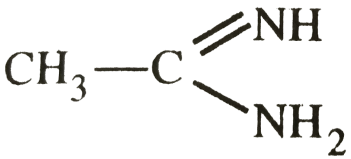
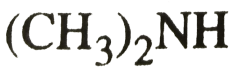
37. The correct order of basicities of the following compounds is



1

2



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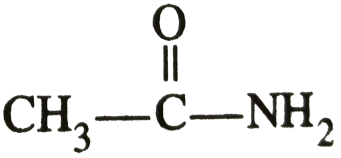

4

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38. Strongest base is

A.

B.

C.

D.

Answer: A

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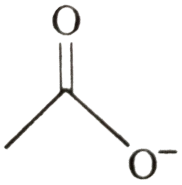
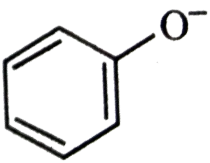
39. Order of the basic strength of the following compounds is

(*i*) 

(*ii*) 

(*iii*) NH_2^-

(*iv*) 

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40. A compound with molecular mass 180 is acylated with CH_3COCl to get a compound with molecular mass 390. the number of amino groups present per molecule of the former compound is

A. 6

B. 2

C. 5

D. 4

Answer: C

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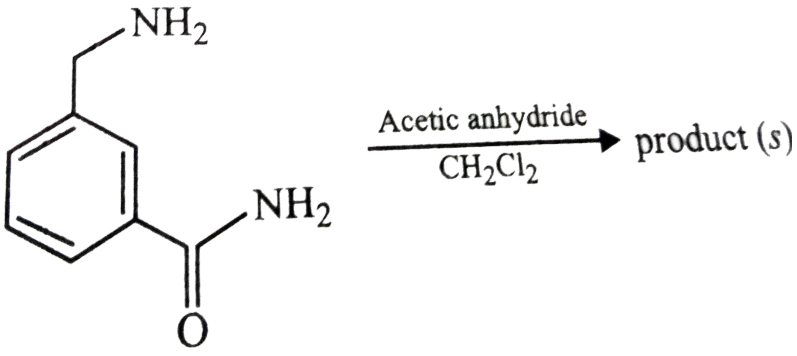
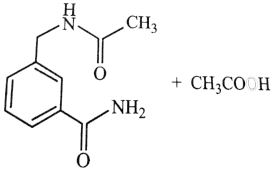
41. In the reaction shown below, the major product formed is/are



A.



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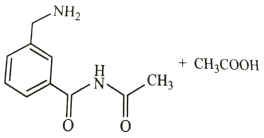
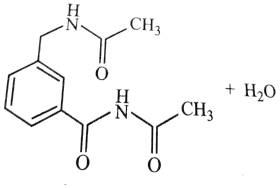
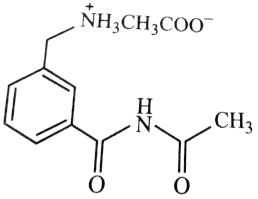


C.



D.



Answer: A

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42. The product formed by the reaction of an aldehyde with a primary amine is:

A. Carboxylic acid

B. aromatic acid

C. Schiff's base

D. ketone

Answer: C

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43. Reaction of cyclohexanone with dimethylamine in the presence of catalytic amount of an acid forms a compound if water during the

reaction is continously removed. The compound formed is generally known as

A. an enamine

B. a Schiff's base

C. an amine an imine

D. an imine

Answer: A

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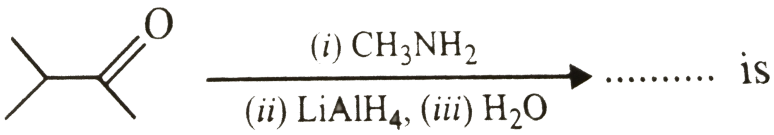
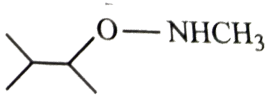
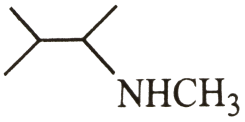
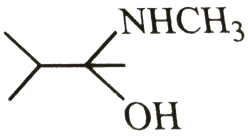
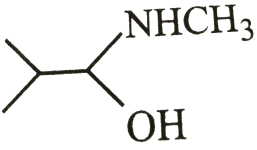
44. The major organic product formed from the following reaction



A. 

B. 

C. 

D. 

Answer: B

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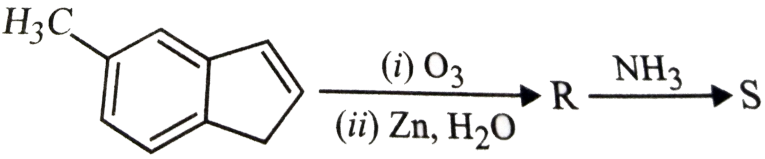
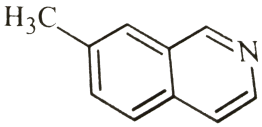
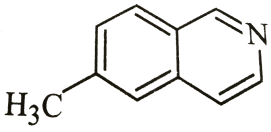
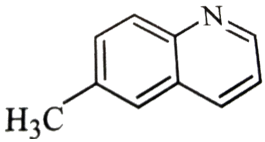
45. In the following reactions, the product S is



A. 

B.

C. 

D. 

Answer: A

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46. On heating an aliphatic primary amine with chloroform and enthanolic potassium hydrozide, the organic compound formed is

A. alkyl isocyanide

B. an alkanol

C. an alkanediol

D. an alkyl cyanide

Answer: A

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47. A positive carbylamine test is given by:

A. N,N-dimethylaniline

B. triethylamine

C. N-methylaniline

D. p-methylbenzylamine

Answer: D

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48. The gas leaked from a storage tank of the Union Carbide plant in Bhopal gas tragedy was :

A. Phosgene

B. methylisocyanate

C. methylamine

D. ammonia

Answer: B

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49. An organic compound (C_3H_9N) (A) when treated with nitrous acid , gave an alcohol and N_2 gas was evolved. (A) on warming with $CHCl_3$ and caustiv potash gave (C) which on reduction gave isopropylmethylamine. Predict the structure of (A).

A.

B.

C.

D.

Answer: A

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50. An organic compound 'A' on reduction give compound 'B' which on reaction with trichloromethane and caustic potash foms 'C'. The compound 'C' on catalytic reduction give N-methyl benzenamine, the compound 'A' is:

A. nitrobenzene

B. nitromethane

C. methanamine

D. benzanamine

Answer: A

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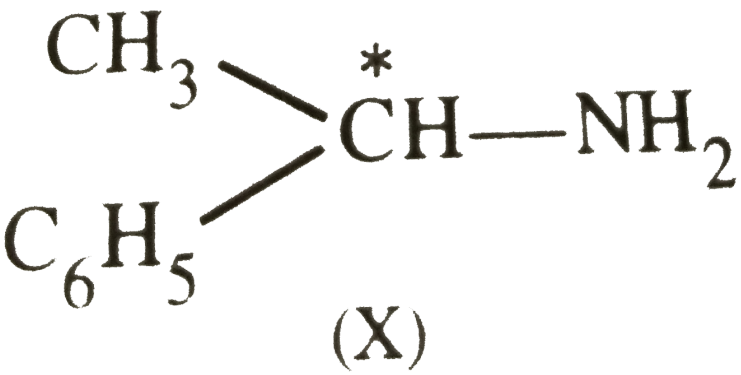
51. The optically active compound (X)



(X)

on treatment with $NaNO_2 / HCl$ gives

A. 1° alcohol with retention of configuration

B. 2° alcohol with inversion of configuration

C. racemic mixture of 2° alcohols

D. racemic mixture of 1° alcohols

Answer: C

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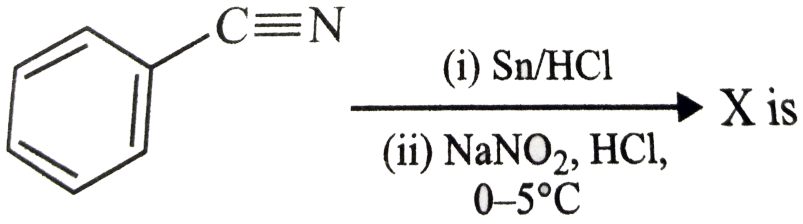
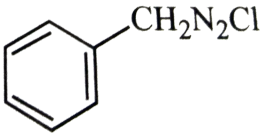
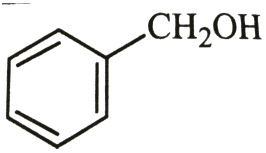
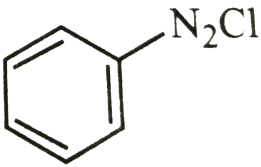
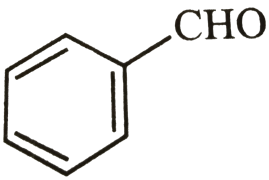
52. 

A. 

B. 

C. 

D. 

Answer: B

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53. Treatment of cyclobutylmethyamine with nitrous acid does not give .

A.

B.

C.

D.

Answer: B

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54. The compound which gives an oily nitrosoamine on reaction with nitrous acid at low temperature is

A. CH_3NH_2

B. $(CH_3)_2CHNH_2$

C. $CH_3 - NH - CH_3$

D. $(CH_3)_3N$

Answer: C

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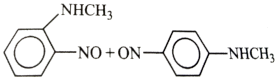
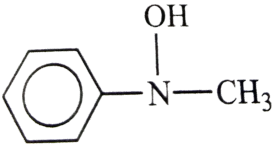
55. Predict the product:

A. 

B. 

C. 

D. 

Answer: D

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56. Which gives black precipitate on reaction with CS_2 followed by addition of $HgCl_2$?

A. $(CH_3)_2CNH_2$

B. $(C_2H_5)_2NH$

C. $(CH_3)_3N$

D. all the three

Answer: A

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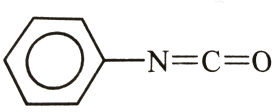
57. The product of the following reaction

A. 

B. 

C. 

D. 

Answer: B

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58. Which among the following amines can be directly oxidized to the corresponding nitro compound by potassium permanganate ?

A. CH_3NH_2

B. $(CH_3)_2CH - NH_2$

C. $(CH_3)_2NH$

D. $(CH_3)_3C - NH_2$

Answer: D

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59. Amino group, $-NH_2$ is ortho, para-directing group in case of aromatic electrophilic substitution but nitration of aniline produce a good amount of m-nitroaniline. This is because

A. Amino group is ortho-,para-directing for aromatic electrophilic substitution. On nitration of aniline, good amount of m-nitroaniline is obtained. This is due to

B. $-NH_2$ get conveted $-NH_3^+$, which is m-directing

C. $-NH_2$ becomes $-NH^+SO_4^-$, which is m-directing

D. $-NH_2$ becomes $-NH^-NO_2^+$, which is m-directing

Answer: B

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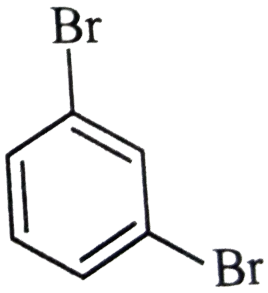
60. The product(s) of the following reaction requence is(are)



A.

B. 

C. 

D. 

Answer: B

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61. In the following reaction,

the structure of the major product 'X' is

A. 

B. 

C. 

D. 

Answer: B

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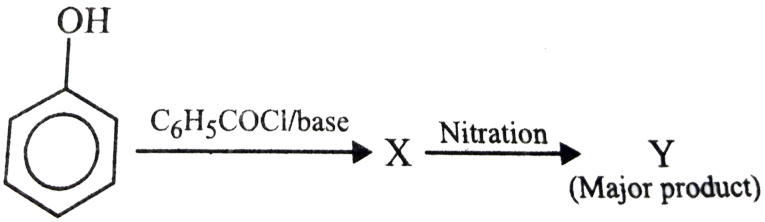

62. Y is.

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63. Anilinum hydrogensulphate on heating with sulphuric acid at 453-473K produces

A. benzenesulphonic acid

B. arthanilic acid

C. m-aminobenzenesulphonic acid

D. sulphanilic acid

Answer: B

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64. The correct sequence of reactions to be performed to convert benzene into m-bromoaniline is :

A. nitration, reduction, bromination

B. bromination, ntiration, reduction

C. nitration, bromination, reduction

D. reduction, nitration, bromination

Answer: B

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65. Which of the following exists as a zwitterion?

A. p-aminophenol salicylic acid

B. salicylic acid

C. sulphanilic acid

D. ethanolamine

Answer: C

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66. The compound that will react most readily with $NaOH$ to from methanol is

A. $(CH_3)_4N^+I^-$

B. CH_3OCH_3

C. $(CH_3)_3S^+I^-$

D. $(CH_3)_3CCl.$

Answer: A

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67. ltrgt The alkene formed as a major product in the above elimination reaction is

A. 

B. $CH_2 = CH_2$

C. 

D. 

Answer: D

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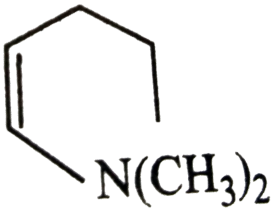
68. In the following reaction,

product X is

A. 

B. 

C. 

D. 

Answer: C

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69. An amine reacts with benzene sulphonyl chloride to give a precipitate insoluble in alkali. It undergoes ammonolysis possible structure will be:

A.

B.

C.

D.

Answer: B

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70. What reagent is used In the Hinsberg's test of amines?

A. $(CH_3CO)_2O$ and pyridine

B. $C_6H_5SO_2Cl$ in aq. NaOH

C. $NaNO_2$ in aq. H_2SO_4

D. CH_3I (excess) followed by AgOH

Answer: B

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71. Which of the following compounds will dissolve in an alkali solution after it has undergone reaction with Hinsberg reagent?

A. CH_3NH_2

B. $(CH_3)_3N$

C. $(C_2H_5)_2NH$

D. $C_6H_5NHC_6H_5$

Answer: A

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72. A given nitrogen-containing compound A reacts with Sn/HCI followed by HNO_2 to give an unstable compund B. B on treatment with pheno1 forms a beautiful coloured compound C with the molecular formula $C_{12}H_{10}N_2O$ The structure of compound A is .

A.

B.

C.

D.

Answer: B

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73. Which of the following statements about primary amines is false ? .

A. Alkylamines are stronger bases than ammonia

B. Alkylamines are stronger bases than aryl amines

C. Alkylamines react with nitrous acid to produce alcohols

D. Arylamines react with nitrous acid to produce phenols

Answer: D

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74. During preparation of arenediazonium salts the excess of nitrous acid, if any, is removed by adding

A. Aq. NaOH

B. Aq. Na_2CO_3

C. Aq. NH_2CONH_2

D. Aq. KI

Answer: C

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75. In the diazotisation of anline with sodium nitrite and hydrochloride acid, an excess of hydrochloric acid is used primarily to

A. suppress the concentration of free aniline

B. suppress the hydrolysis to phenol

C. ensure a stochiometric amount of nitrous acid

D. neutralise the base liberated

Answer: A

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76. Which of the following diazonium salt is most stable ?

A. p-Nitrobenzenediazonium chloride

B. 2,4-Dinitrobenzenediazonium chloride

C. 2,4,6-Trinitrobenzenediazonium chloride

D. p-Methoxybenzenediazonium chloride.

Answer: D

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77. In the diazotisation of aryl amine, the use of nitrous acid is:

A. suppresses hydrolysis of phenol

B. is a source of electrophilic nitrosonium ion

C. neutralises the base liberated

D. all of the above

Answer: B

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78. Which of the following will be most stable diazonium salt $RN_2^+X^-$?

A. $CH_3N_2^+X^-$

B. $C_6H_5N_2^+X^-$

C. $CH_3CH_2N_2^+X^-$

D. $C_6H_5CH_2N_2^+X^-$

Answer: B

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79. In the reaction,

'A' is

A. H_3PO_2 and H_2O

B. H^+ / H_2O

C. $HgSO_4 / H_2SO_4$

D. Cu_2Cl_2

Answer: A

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80. 4-Nitrotoluene is treated with bromine to get a cornpound 'P'. 'P' is reduced with Sn and HCl to get compound 'Q ' .'Q' is diazotised and the product ,is treated with Phosphini, acid to get a compound 'R' . R is oxidised with alkalin $KMnO_4$ to get compound 'S'. Compound 'S' is :

A. 2-bromo-4-hydroxybenzoic acid

B. benzoic acid

C. 4-bromobenzoic acid

D. 2-bromobenzoic acid

Answer: D

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81. In the following reaction , B is $A \xrightarrow{\text{Bromination}} B \xrightarrow{NaNO_2 / HCl} C \xrightarrow[\text{Boiling}]{C_2H_5OH}$ sym - tribromobenzene

A. salicyclic acid

B. benzoic acid

C. phenol

D. 2,4,6-tribromoaniline.

Answer: D

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82. The correct sequence of reactions to convert p-nitrophenol into quinol involves

A. reduction, diazotisation and hydrolysis

B. hydrolysis, diazotization and reduction

C. hydrolysis, reduction and diazotization

D. diazotization, reduction and hydrolysis

Answer: A

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83. Aniline is reacted with bromine water and the resulting product is treated with an aqueous solution of sodium nitrite in presence of hydrochloric acid The compound so formed is converted into a tetrafluoroborate which is subsequently heated The final product is .

A. p-bromofluorobenzene

B. p-bromoaniline

C. 2,4,6-tribromofluorobenzene

D. 1,3,5-tribromobenzene

Answer: C

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84. In the chemical reactions.

the compounds 'A' and 'B' respectively are

A. benzenediazonium chloride and flurobenzene

B. nitrobenzene and chlorobenzene

C. nitrobenzene and flurobenzene

D. phenol and benzene

Answer: A

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85. The final product in the following reaction sequence is

p - chloroaniline $\xrightarrow[0-5^\circ C]{NaNO_2, HCl} \xrightarrow{KCN\,?} \xrightarrow{LiAlH_4\,?}$

A. p-chlorobenzamide

B. p-chlorophenol

C. p-chlorobenzylamine

D. p-chlorobenzyl alcohol

Answer: C

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86. Which of the following is the best method for synthesis of 1 - bromo -3- chlorobenzene?

A.

B.

C.

D.

Answer: C

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87. In the reaction,

The product (E) is

A. 

B. 

C. 

D. 

Answer: A

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88. The final product in the following sequence of ractions is

$$C_6H_5NH_2 \xrightarrow[273-278K]{NaNO_2/HCl} A \xrightarrow{C_6H_6/NaOH} B$$

A. $C_6H_5N_2Cl$

B. C_6H_5OH

C. $C_6H_5 - C_6H_5$

D. $C_6H_5N = NOH$

Answer: C

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89. Complete reduction of benzene-diazonium chloride with Zn/HCl gives :

A. aniline

B. phenylhydrazine

C. azobenzene

D. hydrazobenzene

Answer: A

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90. which of the following is not the correct reaction of aryl diazonium salts?

A. $C_6H_5N_2^+Cl^- + Cu_2Cl_2 \rightarrow C_6H_5Cl$

B. $C_6H_5N_2^+Cl^- + HBF_4 \xrightarrow{Heat} C_6H_5F$

C. $C_6H_5N_2^+Cl^- + H_3PO_2 \rightarrow C_6H_5PO_4$

D. $C_6H_5N_2^+Cl^- + SnCl_2/HCl \rightarrow C_6H_5NHNH_2$

Answer: C

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91. The the identification of β-napthol using dye test, it is necessary to use:

A. dichloromethane solution of β-naphthol

B. acidic solution of β-naphthol

C. neutral solution of β-naphthol

D. alkaline solution of β-naphthol

Answer: D

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Competition Focus Jee Main And Advanced Medical Entrance Special Multiple Choice Questions Ii

1. Isopropylamine can be obtained by

A. $(CH_3)_2C=O+NH_2OH \rightarrow ? \xrightarrow{LiAlH_4}$

B. $(CH_3)_2CO+NH_3 \xrightarrow[\Delta]{Ni/H_2}$

C. $(CH_3)_2CH-Br+NaNH_2 \rightarrow$

D. $(CH_3)_2CH-Br \xrightarrow{NaN_3} ? \xrightarrow{LiAlH_4}$

Answer: A::B::D

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2. Hydrogen bonding plays a central role in which of the following phenomena?

A. Ice floats in water

B. Higher Lewis basicitiy of primary amines than tertiary amines in aqueous solutions

C. forminc acid is more acidic than acetic acid

D. Dimerisation of acetic acid in benzene

Answer: A::B::D

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3. Consider the following compounds

A. I is more basic than II

B. II is more basic than I and III

C. III is more basic than II

D. I is weakly acidic

Answer: B::D

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4. A positive carbylamine test is given by:

A. N,N-dimethylaniline

B. 2,4-dimethylaniline

C. N-methyl-o-methylaniline

D. p-methylbenzylamine

Answer: B::D

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5. p-chloro aniline and anilinium hydrochloride can be distinguished by

A. Sandmeyer reaction

B. $NaHCO_3$ solution

C. $AgNO_3$ solution

D. Carbylamine reaction

Answer: A::B::C

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Competition Focus Jee Main And Advanced Medical Entrance Special Multiple Choice Questions Iii Comprehension Type

1. All aliphatic amines are more basic than ammonia but due to delocalization of lone pair of electrons of the nitrogen atom on the benzene ring, aniline is a weaker base than ammonia. The basic strength of the substituted anilines, however, depends upon the nature of the substituents. Whereas electron-donating groups tend to increase, electron-withdrawing groups tend to decrease the basic strength. the base strenghening effect of the electron-donating groups and base weakening effect of the electron-withdrawing groups is, however, more pronounced at p-than at m-position. However, due to ortho effect, o-substituted anilines are weaker bases than anilines regardless of the nature of substituent whether electron-donating or electron-withdrawing.

Q. Among the following, weakest base is

A. $C_6H_5CH_2NH_2$

B. $C_6H_5CH_2NHCH_3$

C. $O_2N - CH_2NH_2$

D. CH_3NHCHO

Answer: D

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2. The acidic strength of saturated aliphatic carboxylic acids depends mainly upon the inductive effect of the substituent and its position w.r.t., the -COOH group. Whereas electron donating substituents tend to decrease, electron withdrawing substituents tend to increase the acid sttrength. the acidic strength of aromatic carboxylic acids, on the other hand, depends upon both the inductive and the resonance effect of the substituents

Q. Among the following, the strongest acid is

A.

B.

C.

D.

Answer: A

3. All aliphatic amines are more basic than ammonia but due to delocalization of lone pair of electrons of the nitrogen atom on the benzene ring, aniline is a weaker base than ammonia. The basic strength of the substituted anilines, however, depends upon the nature of the substituents. Whereas electron-donating groups tend to increase, electron-withdrawing groups tend to decrease the basic strength. the base strenghening effect of the electron-donating groups and base weakening effect of the electron-withdrawing groups is, however, more pronounced at p-than at m-position. However, due to ortho effect, o-substituted anilines are weaker bases than anilines regardless of the nature of substituent whether electron-donating or electron-

withdrawing.

Q. Among the following, the weakest base is

A. $C_6H_5NH_2$

B. $p - CH_3O - C_6H_4NH_2$

C. $m - CH_3O - C_6H_4NH_2$

D. $o - CH_3O - C_6H_4NH_2$

Answer: C

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4. Treatment of compound O with $KMnO_4 / H^+$

gave P, which on heating with ammonia gave Q. the compound Q on treatment with $Br_2 / NaOH$ produced R. On strong heating, Q gae S, which on further treatment with ehtyl 2-bromopropanoate in the presence of KOH followed by acidification, gave a compound T.

Q. The compoudn R is

A. 

B. 

C. 

D. 

Answer: A

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5. Treatment of compound O with $KMnO_4 / H^+$

gave P, which on heating with ammonia gave Q. the compound Q on treatment with $Br_2 / NaOH$ produced R. On strong heating, Q gae S, which on further treatment with ehtyl 2-bromopropanoate in the presence of KOH followed by acidification, gave a compound T.

Q. The compound T is

A. glycine

B. alanine

C. valine

D. serine

Answer: B

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6. Arenediazonium salts are more stable than alkanediazonium salts due to dispersal fo the positive charge on the benzene ring. Obviously, electron-donating groups favour diazotisation by retarding the decomposition of diazonium salts to phenyl cation. The high reactivity of arenediazonium salts is due to the excellent leaving ability of the diazo group as N_2 gas.

Q. consider the following ions:

The reactivity of these ions towards azo coupling reactions under similar conditions is

A. $I < IV < II < III$

B. $I < III < IV < II$

C. $III < I < II < IV$

D. $III < I < IV < II$

Answer: B

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7. Statement-1: Acetylaceotne complexes of the metal ions are more stable than the corresponding ethylenediamine complexes.

Statement-2: Acetylacetone complexes of the metal ions contain a six membered conjugate chelate rings and the resonance in its chelate ion is an additional factor contributing to the stability.

A.

B.

C.

D.

Answer: A

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8. Which one of the following aryl amine undergoes diazotisation most readily ?

A.

B.

C.

D.

Answer: C

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9. Phenol reacts with benzoyl chloride in the presence of dilute $NaOH$ to form

A.

B.

C.

D.

Answer:

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Competition Focus Jee Main And Advanced Medical Entrance Special Iv Mathing Type Questions

1. Match the four starting materials (P,Q,R,S) given in List I with the corresponding reaction schemes (I,II,III,IV) provided in List II and select the correct answer using the code given below the lists.

A. P-1,Q-4,R-2,S-3

B. A-3,Q-1,R-4,S-2

C. P-3,Q-4,R-2,S-1

D. P-4,Q-1,R-3,S-2

Answer: C

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Competition Focus Jee Main And Advanced Medical Entrance Special Vi Integer Type Questions

1. How many isomeric alkanes having the molecular formula C_5H_{12} are possible?

A.

B.

C.

D.

Answer: 8

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2. Bond energy of $N-H, H-H$ and $N \equiv N$ are a, b, c respectively. The ΔH for the reaction,

$2NH_3 \rightarrow N_2 + 3H_2$ is :

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3. Total number of nitrogen atoms presentin reduced product obtained by reducing nitrobenzene with $LiAlH_4$ followed by aqueous work up is

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4. Amongst the following, the total number of compounds soluble in aqueous NaOH is

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5. How many of the following amines will undergo diazotisation tert-Butylamine, ethanamine, aniline, N-methylaniline,p-toluidine,m-chloroaniline,2-phenylethanamine,o-anisidine,2,4,6-tribromoaniline

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Competition Focus Jee Main And Advanced Medical Entrance Special Vii Assertion Reason Type Questions

1. (A) $CuCl_2$ gives a deep blue coloured solution with ethylamine.

(R) Ethylamine molecules co-ordinate with cupric ions forming a blue coloured complex.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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2. Statement-1: m-Methoxyaniline (m-anisidine) is a weaker base than p-methoxyaniline (p-anisidine).

Statement-2: At m-position, methoxy group can exert only +R-effect but not -I-effect.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: C

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3. Statement-1: Aniline racts with bromine water to form 2,4,6-tribromoaniline.

Statement-2: Aniline is resonance stabilized.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: B

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4. Statement I: In strongly acidic solutions , anline becomes more reactive towards electrophilic reagents Statement II: The amino group being completely protonated in strongly acidic solution, the lone pair of electrons on nitrogen is no longer available for resonance.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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5. Statement I: Aniline on reaction with $NaNO_2HCl$ at $0^\circ C$ followed by coupling with β-naphthol gives a dark blue coloured precipitate.

Statement II: The colour of the compound formed in the reaction of aniline with $NaNO_2 / HCl$ at $0^\circ C$ followed by coupling with β-naphthol is due to extended conjugation.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: D

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Competition Focus Jee Main And Advanced Medical Entrance Special Vii Assertion Reason Type Questions Type Ii

1. Assertion: Nitrobenzene is used as a solvent in Friedel-Craft's reaction.

Reason: Fusion of nitrobenzene with solid KOH gives a low yield of a mixture of o-and p-nitro phenols.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: B

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2. Assertion: Methyl cyanide has higher boiling point than methyl isocyanide.

Reason: Dipole moment of methyl cyanide is higher than that of methyl isocyanide.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: A

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3. Assertion: Gabriel phthalimide reaction can be used to prepare aryl and alkyl amines.

Reason: Aryl halides have same reactivity as alkyl halides towards nucleophilic substitution reactions.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: D

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4. Assertion : Anilinium choride is more acidic than ammonium chloride.

Reason : Anilinium ion is resonance-stabilised.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: C

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5. Assertion : ptoluidine is a stronger base than mtoluene.

Reason : Methyl group from mposition exerts smaller electron donating inductive (+I) effect than from pposition

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: B

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6. (A) Pyrrole is more basic than pyridine.

(R) In pyrrole, nitrogen is sp^2-hybridized.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: D

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7. Assertion: In benzimidazole,  both the nitrogens $\left(\overset{I}{N} \text{ and } (II)(N)\right)$ are basic.

Reason: Lone pair of electrons present in $\overset{I}{N}$ are involved in delocalisation.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: D

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8. Assertion: N_3^- is a weaker base than NH_2^-

Reason: The lone pair of electrons on N atom in N_3^- is in a sp^2-orbital while inNH_2^- it is in an sp^(3)`-orbital.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: A

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9. Assertion: Aniline does not undergo Friedel Crafts reaction.

Reason : Friedel Crafts reaction is an electrophilic substitution reaction.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are ture, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason are false.

Answer: B

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Important Questions For Board Examination

1. Explain the mechanism of nitration of benzene.

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2. Explain why nitration of nitrobenzene gives m-dinitrobenzene and not o- and p-dinitroenzene.

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3. What is Baker Mulliken's test ? Discuss its chemistry.

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4. How will you convert toluene into sym. -trinitrobenzene?

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5. Discuss briefly the reduction of nitrobenzene in acidic, basic and neutral media.

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6. Give equations of the following reactions :

(i) Oxidation of propan-1-ol with alkaline $KMnO_4$ solution.

(ii) Bromine in CS_2 with phenol.

(iii) Treating phenol with chloroform in presence of aqueous NaOH.

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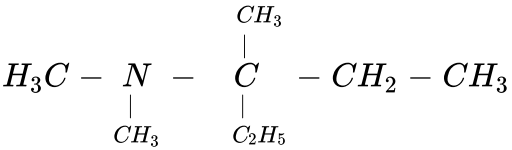
7. Write the IUPAC name of the following compound:



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8. Write one chemical each to illustrate the following :

(i) Hofmann's bromamide reaction

(ii) Gabriel phthalimide synthesis

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9. How will you convert cyclohexanecarboxamide to N-methylcyclohexylamine?

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10. Arrange the following in increasing order of their basic strength.

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

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11. Arrange the following compunds in increasing order of solubility in water:

$C_6H_5NH_2, (C_2H_5)_2NH, C_2H_5NH_2$

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12. Account for the following:

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

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

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

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

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

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

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

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13. What do you mean by (i) acetylation and (ii) benzoylation of amines? Give one example in each case. Why is benzoylation carried out in presence of pyridine?

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14. tert-Butylamine cannot be prepared by action of ammonia on tert-butyl bromide. Why? Explain.

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15. $C_5H_{13}N$ reacts with HNO_2 to give an optically active alcohol The compound is

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16. Complete the followng reaction?

(i) $R-NH_2+CHCl_3+KOH(aq)\rightarrow$

(ii) $C_6H_5N(CH_3)_2+HNO_2\rightarrow$

(iii) $C_6H_5NHCH_3+HNO_2\rightarrow .$

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17. Why ethanolic KOH and not aqueous KOH is used in the isocyanide test of aniline ? Explain

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18. (a) Why is NH_2 group group acetylated before carrying out nitration?

(b) Give increasing order towards electrophilic substitution of the following compounds.

$C_6H_5CH_3, C_6H_5N(CH_3)_2, C_6H_5\overset{+}{N}(CH_3)_3, C_6H_5CH_2\overset{+}{N}(CH_3)_3.$

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19. How will you distinguish primary, secondary and tertiary amines by Hinshberg's reagent? Give chemical equations?

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20. Discuss briefly the chemistry of azo dye test.

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21. Aniline does not undergo friedel-crafts reaction. Explain.

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22. What is diazotisation? Why are benzenediazonium salts more stable than alkanediazonium salts?

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23. Illustrate the following with one example in each case?

(i) Sandmeyer reaction (ii) Balz-Schiemann reaction.

(iii) Gomberg-Bachmann reaction.

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24. Write equations of the following reactions:

(i) Acetylation of aniline

(ii) Coupling reaction

(iii) Carbylamine reaction

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25. In the following sequence of reactions, write the structures of the compounds P,Q and R

$P \xrightarrow{Sn/HCl} Q \xrightarrow[(ii)\,H_2O/H_3PO_2]{(i)\,NaNO_2/HCl,273-278K} R \xrightarrow{KMnO_4/OH^-}$ o-Bromobenzoic acid.

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26. How will you convert benzenediazonium chloride into:

(i) benzene, (ii) anisole and (iii) phenylhydrazine?

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27. How will you distinguish between the following pairs of compounds?

(i) methylamine and ethylamine.

(ii) Aniline and N-methylaniline.

(iii) $(CH_3)_2NH$ and $(CH_3)_3N$.

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