I. Multiple Choice Questions (Type-I)

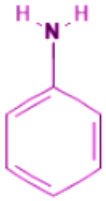
1. Which of the following is a 3° amine?
(i) 1-methylcyclohexylamine
(ii) Triethylamine
(iii) tert-butylamine
(iv) N-methyl aniline
Solution:
Option (ii) is the answer.

2. The correct IUPAC name for CH2==CHCH2 NHCH3 is
(i) Allylmethylamine
(ii) 2-amino-4-pentene
(iii) 4-aminopent-1-ene
(iv) N-methylprop-2-en-1-amine
Solution:
Option (iv) is the answer.

3. Amongst the following, the strongest base in aqueous medium is _____.
(i) CH3NH2
(ii) NCCH2NH2
(iii) (CH3)2 NH
(iv) C6H5NHCH3
Solution:
Option (iii) is the answer.

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

A.



B.

C.

D.

CH_3NH_2

Solution:
Option (A) is the answer.

5. Benzylamine may be alkylated as shown in the following equation :
$C_6H_5CH_2NH_2 + R—X \rightarrow C_6H_5CH_2NHR$
Which of the following alkyl halides is best suited for this reaction through SN1 mechanism?
(i) CH_3Br
(ii) C_6H_5Br
(iii) $C_6H_5CH_2Br$
(iv) C_2H_5Br
Solution:
Option (iii) is the answer.

6. Which of the following reagents would not be a good choice for reducing an aryl nitro compound to an amine?
(i) H2 (excess)/Pt
(ii) LiAlH4 in ether
(iii) Fe and HCl
(iv) Sn and HCl
Solution:
Option (ii) is the answer.

7. **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 a source of nitrogen is _____.
(i) Sodium amide, $NaNH_2$
(ii) Sodium azide, NaN_3
(iii) Potassium cyanide, KCN
(iv) Potassium phthalimide, $C_6H_4(CO)_2N–K^+$
Solution:
Option (iii) is the answer.

8. **The source of nitrogen in Gabriel synthesis of amines is _____.**
(i) Sodium azide, NaN_3
(ii) Sodium nitrite, $NaNO_2$
(iii) Potassium cyanide, KCN
(iv) Potassium phthalimide, $C_6H_4(CO)_2N–K^+$
Solution:
Option (iv) is the answer.

9. **Amongst the given set of reactants, the most appropriate for preparing 2° amine is _____.**
(i) 2° R—Br + NH_3
(ii) 2° R—Br + NaCN followed by H_2/Pt
(iii) 1° R—NH_2 + RCHO followed by H_2/Pt
(iv) 1° R—Br (2 mol) + potassium phthalimide followed by H_3O^+/heat
Solution:
Option (iii) is the answer.

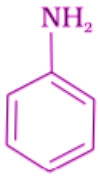
10. The best reagent for converting 2–phenylpropanamide into 2-phenylpropanolamine is _____.
(i) excess H_2
(ii) Br_2 in aqueous NaOH
(iii) iodine in the presence of red phosphorus
(iv) $LiAlH_4$ in ether
Solution:
Option (iv) is the answer.

11. The best reagent for converting, 2-phenylpropanamide into 1- phenylethanamine is ____.
(i) excess H_2/Pt
(ii) NaOH/Br_2
(iii) $NaBH_4$/methanol
(iv) $LiAlH_4$/ether
Solution:
Option (ii) is the answer.

12. Hoffmann Bromamide Degradation reaction is shown by _____.
(i) $ArNH_2$

(ii) ArCONH2
(iii) ArNO2
(iv) ArCH2NH2
Solution:
Option (ii) is the answer.

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



(I)

(II)

(III)

(i) II < III < I
(ii) III < I < II
(iii) III < II < I
(iv) II < I < III
Solution:
Option (iv) is the answer.

14. Methylamine reacts with HNO2 to form _____.
(i) CH3—O—N==O
(ii) CH3—O—CH3
(iii) CH3OH
(iv) CH3CHO
Solution:
Option (iii) is the answer.

15. The gas evolved when methylamine reacts with nitrous acid is _____.
(i) NH3
(ii) N2
(iii) H2
(iv) C2H6
Solution:
Option (ii) is the answer.

16. In the nitration of benzene using a mixture of conc. H2SO4 and conc. HNO3,the species which initiates the reaction is _____.
(i) NO2
(ii) NO+
(iii) NO2+
(iv) NO2–
Solution:
Option (iii) is the answer.

17. Reduction of aromatic nitro compounds using Fe and HCl gives _____.
(i) aromatic oxime
(ii) aromatic hydrocarbon
(iii) aromatic primary amine
(iv) aromatic amide
Solution:
Option (iii) is the answer.

18. The most reactive amine towards dilute hydrochloric acid is _____.
Solution:

(i) $CH_3—NH_2$ (ii) $(H_3C)_2NH$ (iii) $(H_3C)_2N—CH_3$ (iv) 

Solution:
Option (ii) is the answer.

19. Acid anhydrides on reaction with primary amines give _____.
(i) amide
(ii) imide
(iii) secondary amine
(iv) imine
Solution:
Option (i) is the answer

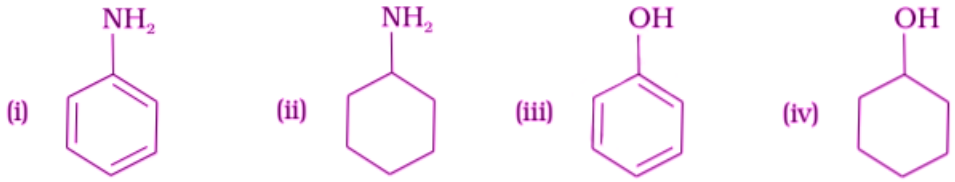
20. The reaction Ar + N2Cl– →)Cu/HCl)-- ArCl + N2 + CuCl is named as _____.
(i) Sandmeyer reaction
(ii) Gatterman reaction
(iii) Claisen reaction
(iv) Carbylamine reaction
Solution:

Option (ii) is the answer.

21. The best method for preparing primary amines from alkyl halides without changing the number of carbon atoms in the chain is
(i) Hoffmann Bromamide reaction
(ii) Gabriel phthalimide synthesis
(iii) Sandmeyer reaction
(iv) Reaction with NH3
Solution:
Option (ii) is the answer.

22. Which of the following compound will not undergo an azo coupling reaction with benzene diazonium chloride.
(i) Aniline
(ii) Phenol
(iii) Anisole
(iv) Nitrobenzene
Solution:
Option (iv) is the answer.

23. Which of the following compounds is the weakest Brönsted base?
Solution:



Solution:
Option (iii) is the answer.

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

Solution;

Option (iv) is the answer.

25. The correct decreasing order of basic strength of the following species is _____. H2O, NH3, OH–, NH2–
(i) NH2– > OH – > NH3 > H2O
(ii) OH– > NH2– > H2O > NH3
(iii) NH3 > H2O > NH2– > OH–
(iv) H2O > NH3> OH– > NH2–
Solution:
Option (i) is the answer.

26. Which of the following should be most volatile?

(i) II
(ii) IV
(iii) I
(iv) III
Solution:
Option (ii) is the answer.

27. Which of the following methods of preparation of amines will give the same number of carbon atoms in the chain of amines as in the reactant?
(i) The reaction of nitrite with LiAlH4.
(ii) The reaction of the amide with LiAlH4 followed by treatment with water.
(iii) Heating alkyl halide with potassium salt of phthalimide followed by hydrolysis.
(iv) Treatment of amide with bromine in the aqueous solution of sodium hydroxide.
Solution:
Option (iii) is the answer.

II. Multiple Choice Questions (Type-II)
Note: In the following questions two or more options may be correct.

28. Which of the following cannot be prepared by Sandmeyer's reaction?
(i) Chlorobenzene
(ii) Bromobenzene
(iii) Iodobenzene

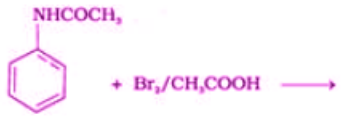
(iv) Fluorobenzene
Solution:
Option (iii) and (iv) are the answers.

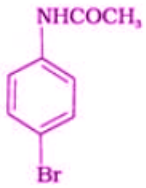
29. Reduction of nitrobenzene by which of the following reagent gives aniline?
(i) Sn/HCl
(ii) Fe/HCl
(iii) H2-Pd
(iv) Sn/NH4OH
Solution;
Option (i), (ii) and (iii) are the answers.

30. Which of the following species are involved in the carbylamine test?
(i) R—NC
(ii) CHCl3
(iii) COCl2
(iv) NaNO2 + HCl
Solution:
Option (i) and (ii) are the answers.

31. The reagents that can be used to convert benzene diazonium chloride to benzene are _____.
(i) SnCl2/HCl
(ii) CH3CH2OH
(iii) H3PO2
(iv) LiAlH4
Solution:
Option (ii) and (iii) are the answers.

32. The product of the following reaction is _____.



A.


B.

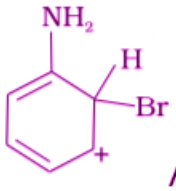

C.

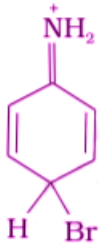

D.

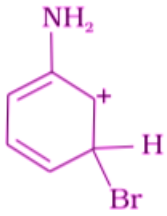

Solution:
Option (A) and (B) is the answer.

33. Arenium ion involved in the bromination of aniline is _____.

(i)


(ii)


(iii)


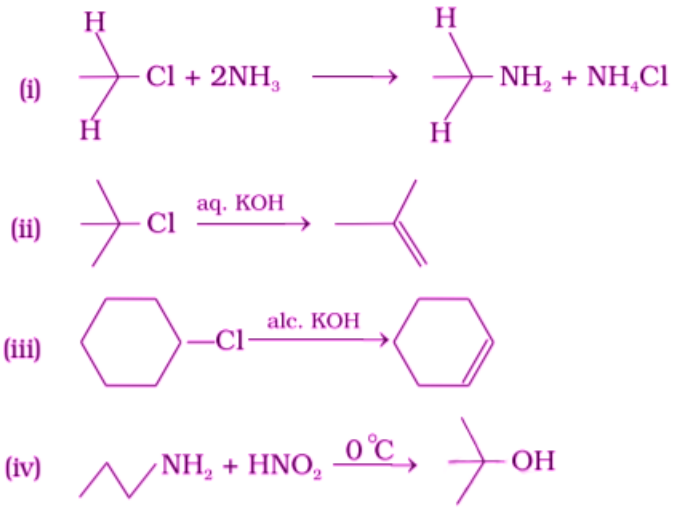
(iv)


A.

Solution:
Option (i), (ii) and (iii) are the answers.

34. Which of the following amines can be prepared by Gabriel synthesis.
(i) Isobutyl amine
(ii) 2-Phenylethylamine
(iii) N-methyl benzylamine
(iv) Aniline
Solution:
Option (i) and (ii) are the answers.

35. Which of the following reactions are correct?



Solution:
Option (i) and (iii) are the answers.

36. Under which of the following reaction conditions, aniline gives p-nitro derivative as the major product?
(i) Acetyl chloride/pyridine followed by reaction with conc. H2SO4 + conc. HNO3
(ii) Acetic anhydride/pyridine followed by conc. H2SO4 + conc. HNO3
(iii) Dil. HCl followed by reaction with conc. H2SO4 + conc. HNO3
(iv) Reaction with conc. HNO3 + conc.H2SO4
Solution:
Option (i) and (ii) are the answers.

37. Which of the following reactions belong to electrophilic aromatic substitution?
(i) Bromination of acetanilide
(ii) Coupling reaction of aryldiazonium salts
(iii) Diazotisation of aniline
(iv) Acylation of aniline
Solution:
Option (i) and (ii) are the answers.

III. Short Answer Type

38. What is the role of HNO3 in the nitrating mixture used for nitration of benzene?
Solution:
Nitrating mixture is the mixture of 1:1 solution of HNO3 and H2SO4 and is used for the nitration of organic compounds. It acts as a base and provides electrophile in the nitration process of benzene.

39. Why is NH2 group of aniline acetylated before carrying out nitration?
Solution:
To control the nitration reaction and tarry oxidation products and nitro derivatives products formation, the NH2 group of aniline is acetylated before carrying out nitration. Here, the major product is p-

nitroaniline.

40. What is the product when C6H5CH2NH2 reacts with HNO2?

Solution:

C6H5CH2NH2 reacts with HNO2 to form unstable diazonium salt, which in turn gives alcohol.

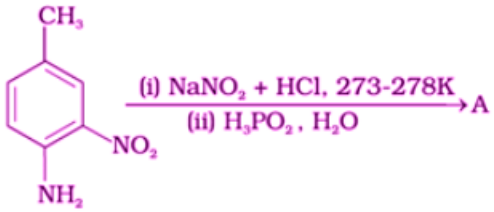
$C_6H_5CH_2NH_2 + HNO_2 \rightarrow C_6H_5CH_2OH + N_2 + H_2O$

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

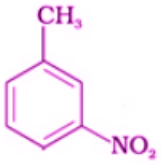
Solution:

The best reagents for the conversion of nitrile to primary amine are $LiAlH_4$ and Sodium/Alcohol. By reduction, the nitriles can be converted into a corresponding primary amine.

42. Give the structure of 'A' in the following reaction.



Solution:



The product formed in this chemical reaction is 3-Methylnitrobenzene.

43. What is Hinsberg reagent?

Solution:

Benzenesulphonyl chloride or, C_6H_5SOCl is commonly known as Hinsberg's reagent. Hinsberg's reagent is be used to distinguish primary, secondary and tertiary amines.

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

Solution:

Benzene diazonium chloride is highly soluble in water at high temperature and is itself very stable at low temperature. It should be used immediately after its preparation as it is unstable.

45. Why does the acetylation of —NH2 group of aniline reduce its activating effect?
Solution:
The acetylation of —NH2 group of aniline reduces its activating effect because the lone pair of electrons on the nitrogen of acetanilide interacts with oxygen atom due to resonance.

46. Explain why MeNH2 is a stronger base than MeOH?
Solution:
MeNH2 is a stronger base than MeOH because of the lower electronegativity and the presence of the lone pair of electrons on the nitrogen atom in MeNH2.

47. What is the role of pyridine in the acylation reaction of amines?
Solution:
The activating effect of –NH2 group can be controlled by protecting the -NH2 group by acetylation with acetic anhydride in presence of pyridine and then carrying out the desired substitution followed by hydrolysis of the substituted amide to the substituted amine. Pyridine is a base that is used to get rid of HCl as a side product from the reaction.

48. Under what reaction conditions (acidic/basic), the coupling reaction of aryldiazonium chloride with aniline is carried out?
Solution:
This reaction is carried out in a mild basic medium. This is an electrophilic substitution reaction. Aryldiazonium chloride reacts with aniline to form a yellow dye of p-Aminoazobenzene.

49. Predict the product of the reaction of aniline with bromine in a non-polar solvent such as CS2.
Solution:
The products formed in the reaction of aniline with bromine in a non-polar solvent such as CS2 are 4-Bromoaniline and 2-Bromoaniline where 4-Bromoaniline is the major product.

50. Arrange the following compounds in increasing order of dipole moment.
CH3CH2CH3, CH3CH2NH2, CH3CH2OH
Solution:
CH3CH2CH3 < CH3CH2NH2 < CH3CH2OH
The dipole moment of CH3CH2OH is greater than that of CH3CH2NH2. CH3CH2CH3 has the least dipole moment among the three given compounds because it is almost a non-polar molecule.