1. Which of the following is a primary amine?

A. $(CH_3)_3N$
B. CH_3NH_2
C. $CH_3CH_2NHCH_3$
D. $(CH_3)_2NH$

Answer: B. CH_3NH_2
Explanation: A primary amine has one alkyl group attached to nitrogen; CH_3NH_2 fits this.

2. Gabriel phthalimide synthesis is used for preparation of:

A. Aromatic amines
B. Secondary amines
C. Primary amines
D. Tertiary amines

Answer: C. Primary amines
Explanation: Gabriel synthesis is best suited for synthesizing primary aliphatic amines.

3. Which of the following compounds will not respond to the carbylamine test?

A. CH_3NH_2
B. $C_6H_5NH_2$
C. $CH_3CH_2NHCH_3$
D. NH_2CH_2COOH

Answer: C. $CH_3CH_2NHCH_3$
Explanation: Carbylamine test is given by primary amines only.

4. The basic strength of amines in aqueous medium decreases in the order:

A. $NH_3 < RNH_2 < R_2NH < R_3N$
B. $R_3N < RNH_2 < NH_3 < R_2NH$
C. $R_2NH > RNH_2 > R_3N > NH_3$
D. $NH_3 > RNH_2 > R_2NH > R_3N$

Answer: C. $R_2NH > RNH_2 > R_3N > NH_3$

Explanation: Secondary amines have optimal solvation and inductive effect enhancing basicity.

5. Hinsberg test is used to distinguish between:

A. Aldehydes and ketones
B. Primary and secondary alcohols
C. Primary, secondary, and tertiary amines
D. Alkanes and alkenes

Answer: C. Primary, secondary, and tertiary amines
Explanation: Hinsberg reagent reacts differently with each class of amine.

6. The reaction of aniline with Br_2 water gives:

A. p-Bromoaniline
B. 2,4,6-Tribromoaniline
C. o-Bromoaniline
D. Aniline dibromide

Answer: B. 2,4,6-Tribromoaniline
Explanation: Electron-rich benzene ring of aniline undergoes bromination at ortho and para positions.

7. Which of the following amines is most basic in aqueous solution?

A. $C_6H_5NH_2$
B. $(CH_3)_2NH$
C. NH_3
D. CH_3NH_2

Answer: B. $(CH_3)_2NH$
Explanation: Secondary aliphatic amines are most basic due to inductive effect and solvation.

8. Aniline does not undergo Friedel–Crafts alkylation easily due to:

A. High basicity
B. Formation of insoluble complexes with $AlCl_3$
C. Deactivation of ring

D. Oxidation of aniline

Answer: B. Formation of insoluble complexes with $AlCl_3$
Explanation: Lewis acid ($AlCl_3$) reacts with $–NH_2$ group and prevents electrophilic substitution.

9. Diazotisation of aniline is carried out at:

A. 0–5°C
B. 100°C
C. Room temperature
D. –20°C

Answer: A. 0–5°C
Explanation: Diazonium salt is unstable above 5°C and decomposes.

10. The diazonium salt of aniline reacts with phenol in basic medium to form:

A. Nitrobenzene
B. Aniline yellow
C. Azobenzene dye
D. Benzidine

Answer: C. Azobenzene dye
Explanation: Coupling reaction forms brightly colored azo compounds.

11. Which reagent is used for converting nitrobenzene to aniline?

A. Zn/HCl
B. $NaBH_4$
C. NaOH
D. $KMnO_4$

Answer: A. Zn/HCl
Explanation: Reduction of nitrobenzene with Zn/HCl gives aniline.

12. Acetylation of aniline reduces:

A. Its nucleophilicity
B. Its solubility
C. Its boiling point
D. Its basicity

Answer: D. Its basicity
Explanation: Acetyl group withdraws electrons from N, reducing its basicity.

13. Ethylamine reacts with nitrous acid to form:

A. Alcohol
B. Nitroalkane
C. Alkene
D. Aldehyde

Answer: A. Alcohol
Explanation: Aliphatic primary amines react with HNO_2 to give alcohols and N_2.

14. Which of the following is most basic in gas phase?

A. NH_3
B. CH_3NH_2
C. $(CH_3)_2NH$
D. $(CH_3)_3N$

Answer: D. $(CH_3)_3N$
Explanation: In gas phase, steric hindrance is not an issue; more alkyl groups increase electron density.

15. Which of the following does not undergo diazotization?

A. CH_3NH_2
B. $C_6H_5NH_2$
C. o-Toluidine
D. m-Anisidine

Answer: A. CH_3NH_2
Explanation: Only aromatic primary amines undergo diazotization to form diazonium salts.

16. Which of the following cannot be prepared by Gabriel phthalimide synthesis?

A. CH_3NH_2
B. $C_2H_5NH_2$
C. $C_6H_5NH_2$
D. $H_2NCH_2CH_2OH$

Answer: C. $C_6H_5NH_2$
Explanation: Gabriel phthalimide synthesis is effective only for aliphatic and not for aryl amines due to low nucleophilicity of aryl halides like chlorobenzene.

17. Which of the following amines will not respond to carbylamine test?

A. CH_3NH_2
B. $C_2H_5NH_2$
C. $C_6H_5NH_2$
D. $(CH_3)_2NH$

Answer: D. $(CH_3)_2NH$
Explanation: Carbylamine test is given only by primary amines (both aliphatic and aromatic). Secondary amines do not respond.

18. Hinsberg reagent is used to distinguish between:

A. Aldehyde and ketone
B. Alcohol and phenol
C. 1°, 2°, and 3° amines
D. Primary and secondary alcohols

Answer: C. 1°, 2°, and 3° amines
Explanation: Hinsberg reagent (benzenesulfonyl chloride) reacts differently with 1°, 2°, and 3° amines, allowing their identification.

19. The product formed when aniline is diazotized and then boiled with water is:

A. Benzene
B. Benzoic acid

C. Phenol
D. Chlorobenzene

Answer: C. Phenol
Explanation: Aniline forms diazonium salt, which decomposes in water to form phenol and nitrogen gas.

20. What is the IUPAC name of $CH_3CH_2NHCH_2CH_3$?

A. Diethylamine
B. N-Ethylethanamine
C. Ethylmethylamine
D. N,N-Diethylamine

Answer: A. Diethylamine
Explanation: It's a symmetrical secondary amine with two ethyl groups bonded to nitrogen → Diethylamine.

21. Which of the following is least basic in aqueous solution?

A. CH_3NH_2
B. $(CH_3)_2NH$
C. $(CH_3)_3N$
D. $C_6H_5NH_2$

Answer: D. $C_6H_5NH_2$
Explanation: Lone pair on nitrogen in aniline is delocalized into the benzene ring, reducing electron availability for protonation → least basic.

22. A compound with molecular formula C_2H_7N gives positive carbylamine test. The compound is:

A. $(CH_3)_2NH$
B. $CH_3CH_2NH_2$
C. CH_3CONH_2
D. CH_3NHCH_3

Answer: B. $CH_3CH_2NH_2$
Explanation: It is a primary aliphatic amine. Only primary amines give positive carbylamine test.

23. Which compound reacts with HNO_2 at 0–5°C to form a stable diazonium salt?

A. CH_3NH_2
B. $C_6H_5NH_2$
C. $(CH_3)_2NH$
D. $C_2H_5NH_2$

Answer: B. $C_6H_5NH_2$
Explanation: Aromatic primary amines like aniline form stable diazonium salts below 5°C.

24. Aniline is less basic than methylamine because:

A. Methylamine has more methyl groups
B. Aniline has less electron density on nitrogen due to resonance
C. Aniline forms stronger hydrogen bonds
D. Methylamine is a gas

Answer: B. Aniline has less electron density on nitrogen due to resonance
Explanation: In aniline, lone pair on nitrogen is delocalized into the aromatic ring → decreased basicity.

25. Which of the following gives a yellow oily nitroso compound on reaction with HNO_2?

A. $CH_3CH_2NH_2$
B. CH_3NH_2
C. $(CH_3)_2NH$
D. CH_3CONH_2

Answer: C. $(CH_3)_2NH$
Explanation: Secondary amines react with nitrous acid to give N-nitrosoamines, which are yellow oily liquids.

26. Which test is best to distinguish aromatic primary amine from aliphatic amine?

A. Carbylamine test
B. Hinsberg test
C. Azo dye test
D. Lucas test

Answer: C. Azo dye test

Explanation: Only aromatic primary amines give azo dye formation when coupled with phenol in alkaline medium.

27. Benzene diazonium chloride when heated with CuCN gives:

A. Benzaldehyde
B. Benzoic acid
C. Benzonitrile
D. Benzyl alcohol

Answer: C. Benzonitrile
Explanation: Sandmeyer reaction replaces $–N_2^+Cl^-$ with –CN using CuCN.

28. Diazonium salts are generally stable at:

A. Room temperature
B. Below –10°C
C. 0–5°C
D. Above 10°C

Answer: C. 0–5°C
Explanation: Diazonium salts are stable only at low temperatures (0–5°C) due to their tendency to decompose.

29. Nitroethane on reduction with $LiAlH_4$ gives:

A. Ethanol
B. Ethylamine
C. Acetaldehyde
D. Acetamide

Answer: B. Ethylamine
Explanation: Nitroalkanes get reduced to primary amines using strong reducing agents like $LiAlH_4$.

30. Acetamide on reaction with Br_2 and NaOH gives:

A. Methylamine
B. Ethylamine

C. Aniline
D. Acetanilide

Answer: A. Methylamine
Explanation: This is Hofmann bromamide reaction where an amide is converted to a primary amine with one carbon less.

31. Which of the following will undergo Hofmann bromamide reaction?

A. CH_3NH_2
B. CH_3CONH_2
C. CH_3COOH
D. CH_3CHO

Answer: B. CH_3CONH_2
Explanation: Hofmann bromamide reaction occurs with amides, converting them into primary amines (with one C atom less).

32. Which of the following cannot be prepared by reduction of nitro compound?

A. $C_6H_5NH_2$
B. $CH_3CH_2NH_2$
C. $C_6H_5CH_2NH_2$
D. CH_3NH_2

Answer: C. $C_6H_5CH_2NH_2$
Explanation: Benzylamine ($C_6H_5CH_2NH_2$) is not obtained by nitro reduction. It's usually prepared from benzyl chloride.

33. Which compound gives an isocyanide (foul smell) on heating with chloroform and alcoholic KOH?

A. CH_3NH_2
B. $(CH_3)_2NH$
C. $C_6H_5NH_2$
D. CH_3CONH_2

Answer: A. CH_3NH_2
Explanation: This is the carbylamine reaction given only by primary amines, forming foul-smelling isocyanides.

34. The reaction of benzene diazonium chloride with phenol in alkaline medium gives:

A. Benzene
B. Phenol
C. p-Hydroxyazobenzene
D. Benzoic acid

Answer: C. p-Hydroxyazobenzene
Explanation: Azo dye is formed by coupling of diazonium salt with phenol under alkaline conditions.

35. Which compound reacts with nitrous acid to form alcohol and nitrogen gas?

A. Aniline
B. Ethylamine
C. Dimethylamine
D. Acetamide

Answer: B. Ethylamine
Explanation: Aliphatic primary amines like ethylamine react with HNO_2 to give alcohol + N_2.

36. Which will react with benzene sulphonyl chloride and NaOH to form a clear solution?

A. CH_3NH_2
B. $(CH_3)_2NH$
C. $(CH_3)_3N$
D. $C_6H_5NH_2$

Answer: A. CH_3NH_2
Explanation: Primary amines give N-alkyl sulphonamide soluble in alkali → clear solution in Hinsberg test.

37. Which compound is most basic in aqueous solution?

A. Aniline
B. Methylamine
C. Ammonia
D. p-Nitroaniline

Answer: B. Methylamine
Explanation: It is aliphatic and electron-donating alkyl group increases availability of lone pair → more basic.

38. Which is least basic among the following?

A. $CH_3CH_2NH_2$
B. NH_3
C. $C_6H_5NH_2$
D. $(CH_3)_2NH$

Answer: C. $C_6H_5NH_2$
Explanation: Due to resonance, lone pair on N is delocalized in aniline, reducing its basicity.

39. Which compound gives a positive azo dye test?

A. CH_3NH_2
B. $C_6H_5NH_2$
C. $CH_3CH_2NH_2$
D. $(CH_3)_2NH$

Answer: B. $C_6H_5NH_2$
Explanation: Azo dye test is given by aromatic primary amines only.

40. Acetamide when treated with bromine and aqueous NaOH gives:

A. Methylamine
B. Ethylamine
C. Acetic acid
D. Propylamine

Answer: A. Methylamine
Explanation: Hofmann bromamide degradation reaction → forms amine with one carbon less than amide.

41. The most suitable reagent to convert nitrobenzene to aniline is:

A. H_2/Ni

B. Sn/HCl
C. Fe/HCl
D. All of these

Answer: D. All of these
Explanation: All listed reducing agents can reduce nitrobenzene to aniline.

42. Which of the following amines will not form a diazonium salt on treatment with HNO_2?

A. CH_3NH_2
B. $C_6H_5NH_2$
C. p-Toluidine
D. $(CH_3)_2NH$

Answer: D. $(CH_3)_2NH$
Explanation: Only primary amines form diazonium salts; secondary amines give N-nitrosoamines.

43. In which compound is the lone pair on nitrogen least available for protonation?

A. NH_3
B. CH_3NH_2
C. $C_6H_5NH_2$
D. $(CH_3)_2NH$

Answer: C. $C_6H_5NH_2$
Explanation: Due to delocalization into the benzene ring, nitrogen's lone pair is least available.

44. The correct order of basicity in aqueous solution is:

A. $NH_3 < CH_3NH_2 < (CH_3)_2NH$
B. $(CH_3)_2NH < CH_3NH_2 < NH_3$
C. $C_6H_5NH_2 > CH_3NH_2 > NH_3$
D. $CH_3NH_2 < C_6H_5NH_2 < NH_3$

Answer: A. $NH_3 < CH_3NH_2 < (CH_3)_2NH$
Explanation: More alkyl groups increase basicity by +I effect.

45. Which compound is formed when benzamide reacts with bromine and NaOH?

A. Benzoic acid
B. Benzyl alcohol
C. Aniline
D. Benzene

Answer: C. Aniline
Explanation: Hofmann reaction converts benzamide to aniline (one carbon less than the original compound).