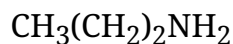


CBSE Test Paper - 01
Class - 12 Chemistry (Amines)

1. In a reaction, a secondary amine forms Nitrosoamine ($R_2N-N=O$), which on heating with phenol and conc H_2SO_4 gives a green colour solution which turns blue on adding alkali. The reaction is called:
 - a. Fries reaction
 - b. Perkin's reaction
 - c. Libermann's nitroso reaction
 - d. Etard's reaction
2. If the starting amide has got four carbon atoms and the amine that is formed has got only 3 carbon atoms, then the reaction is called
 - a. Gabriel synthesis
 - b. carbylamines reaction
 - c. Hoffmann bromamide reaction
 - d. Clemmensen reduction
3. When one of the following reacts with NaOH, the product is sodium benzoate?
 - a. benzene hydroxide
 - b. benzoic acid
 - c. benzaldehyde
 - d. benzene
4. The nitrogen's lone pair in pyrrolidine is best described as occupying what type of orbital?
 - a. s
 - b. sp^2
 - c. sp^3
 - d. sp
5. Which of the following reacts with $NaNO_2 + HCl$ to give alcohol?
 - a. $C_6H_5CH_2NHCH_3$
 - b. CH_3NH_2
 - c. $C_6H_5NH_2$

d. $(\text{CH}_3)_3\text{N}$

6. Write IUPAC name of the following compound and classify it into primary secondary and tertiary amine.



7. Write the reaction taking place when aniline reacts with bromine water.
8. How is orange I prepared?
9. It is difficult to prepare pure amines by ammonolysis of alkyl halides. Give reasons.
10. Why are amines more basic than the comparable alcohols.
11. Write the chemical equations to illustrate the following reactions:
- Sandmeyer reaction.
 - Coupling reaction.
12. Describe the method for the identification of primary, secondary and tertiary amines. Also write chemical equations of the reaction involved.
13. Identify the compounds A, B, C in the following equation.
- $$\text{C}_6\text{H}_5\text{CONH}_2 \xrightarrow[\text{SOCl}_2]{\text{P}_2\text{O}_5 \text{ or}} (\text{A}) \xrightarrow{\text{catalytic reduction}} (\text{B}) \xrightarrow[\text{NaNO}_2/\text{HCl}]{\text{HONO or}} (\text{C})$$
14. Write an equation of the reaction of aniline with benzoyl chloride and write the name of the product obtained.
15. Write short notes on the following:
- Carbylamine reaction
 - Diazotisation
 - Hofmann's bromamide reaction
 - Coupling reaction
 - Ammonolysis

CBSE Test Paper - 01
Class - 12 Chemistry (Amines)
Solutions

1. (c) Libermann's nitroso reaction

Explanation: This is Libermann's nitroso reaction. Secondary amines react with HNO_2 to give N-N nitrosodialkylamine ($\text{R}_2\text{N}-\text{N}=\text{O}$). Nitrosamines are water-soluble yellow oils which when warmed with phenol and conc. H_2SO_4 give green color solution and with alkali, they give a blue color solution. Tertiary amines do not react with nitrous acid.

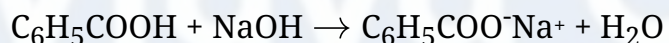
2. (c) Hoffmann bromamide reaction

Explanation: In Hoffmann bromamide degradation reaction, the amine formed has one carbon less than the amide.



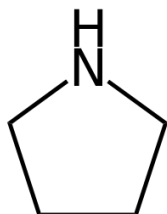
3. (b) benzoic acid

Explanation: Benzoic acid reacts with NaOH to form sodium benzoate, this is a neutralisation reaction where acid reacts with a base to give salt and water.



4. (c) sp^3

Explanation: Pyrrolidine is tetrahydropyrrole.



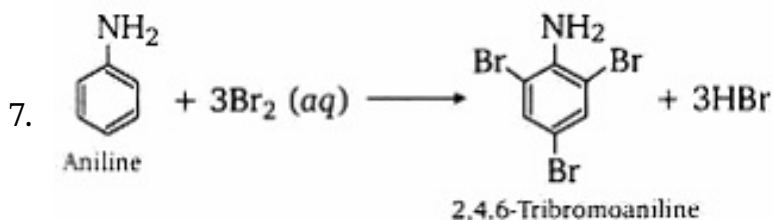
The nitrogen atom in pyrrolidine is sp^3 hybridized. Two sp^3 hybridized orbitals are involved in pairing with carbon, one sp^3 hybridized orbital is involved in pairing with hydrogen and one sp^3 hybridized orbital is occupied by a lone pair.

5. (b) CH_3NH_2

Explanation: Aliphatic primary amines react with nitrous acid (prepared in situ from NaNO_2 and a mineral acid such as HCl) to form aliphatic diazonium salts, which

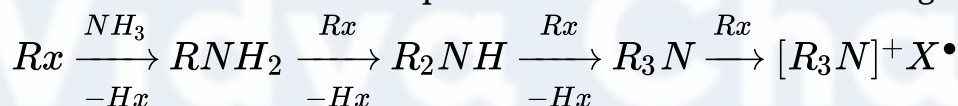
is unstable and decomposes to give a carbocation and evolve N_2 gas. The carbocation so formed reacts with water from medium to give further produce alcohol.

6. Propane-1-amine (1°),



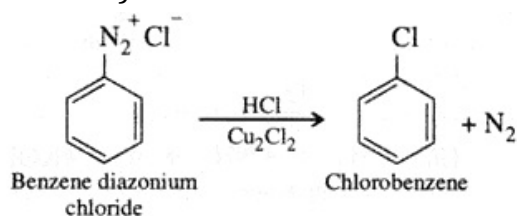
8. It is obtained by coupling reaction between diazotized sulphanilic acid and alkaline solution of β Naphthol.

9. The process of ammonolysis yields a mixture of primary, secondary, tertiary amines and quaternary salts. This is because the primary amine formed can further react with the alkyl halide to form the secondary amine, which in turn will again react with the alkyl halide to form the tertiary amine, which also reacts with the alkyl halide leading to the formation of quaternary salt. Thus such a reaction would form a mixture of all the four compounds and it will be difficult to get the pure amine.

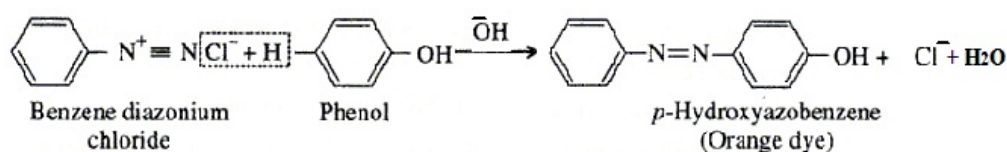


10. Amines are more basic than alcohols because lone pair in nitrogen is more available for incoming acceptor as compared to oxygen as oxygen is more electronegative than nitrogen.

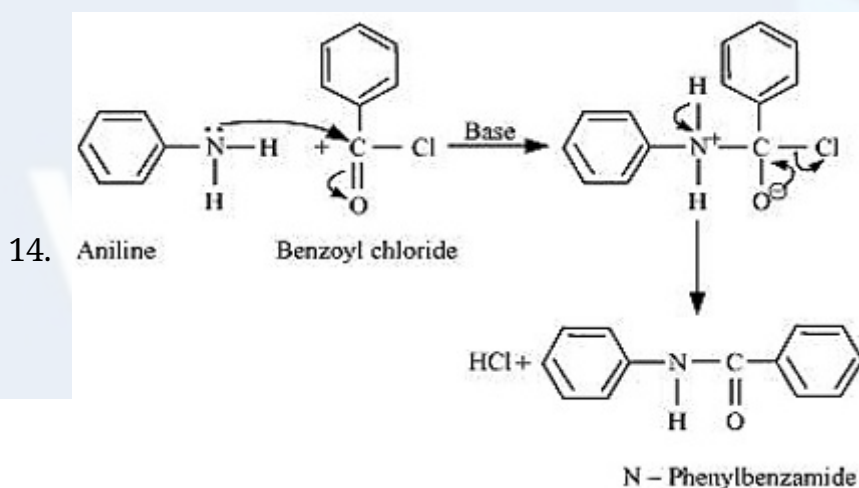
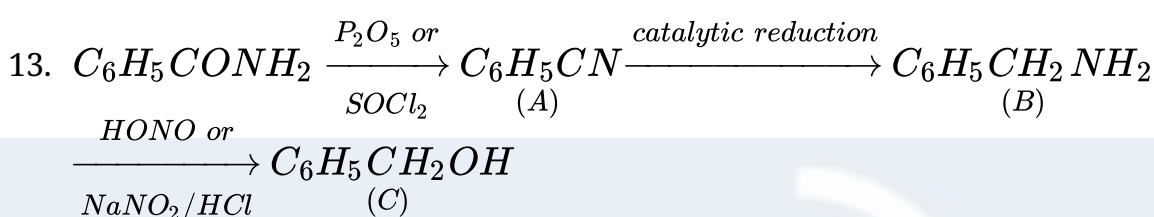
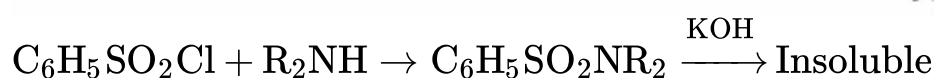
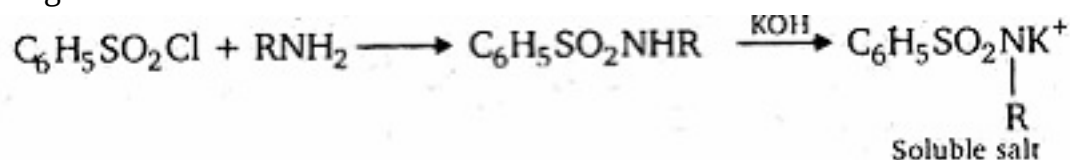
11. i. Sandmeyer reaction:



ii. Coupling reaction:

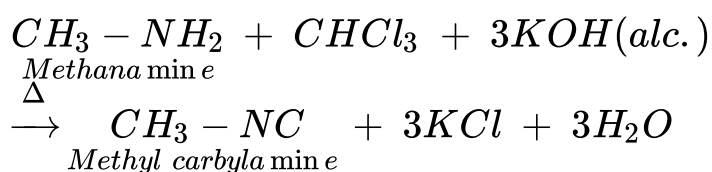


12. Primary, secondary and tertiary amines can be identified by Hinsberg's reagent (Benzenesulphonyl chloride $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$). Primary amines react with Hinsberg's reagent to form sulphonamides soluble in alkali whereas secondary amines form sulphonamides insoluble in alkali. Tertiary amines do not react with Hinsberg's reagent.



15. i. **Carbylamine reaction:** Carbylamine reaction is used as a test for the identification of primary amines. When aliphatic and aromatic primary amines are heated with chloroform and ethanolic potassium hydroxide, carbylamines (or isocyanides) are formed. These carbylamines have very unpleasant odours.

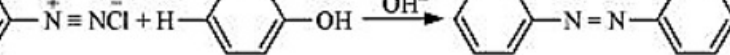
Secondary and tertiary amines do not respond to this test. For example,




ii. **Diazotisation:** Aromatic primary amines react with nitrous acid (prepared in situ from NaNO_2 and HCl) at 273 - 278 K to form diazonium salts. This conversion

$$\text{Aniline} \xrightarrow[273 - 278 \text{ K}]{\text{NaNO}_2 + 2\text{HCl}} \text{Benzenediazonium chloride} + \text{NaCl} + 2\text{H}_2\text{O}$$
$$\begin{array}{l} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{NH}_2 + \text{Br}_2 + 4\text{NaOH} \\ \text{Ethanamide} \\ \rightarrow \text{CH}_3 - \text{NH}_2 + \text{Na}_2\text{CO}_3 + 2\text{NaBr} + 2\text{H}_2\text{O} \\ \text{Methanamine} \end{array}$$

$$\begin{array}{l} \text{O} \\ || \\ \text{C}_6\text{H}_5 - \text{C} - \text{NH}_2 + \text{Br}_2 + 4\text{NaOH} \\ \text{Benzamide} \\ \rightarrow \text{C}_6\text{H}_5 - \text{NH}_2 + \text{Na}_2\text{CO}_3 + 2\text{NaBr} + 2\text{H}_2\text{O} \\ \text{Aniline} \end{array}$$



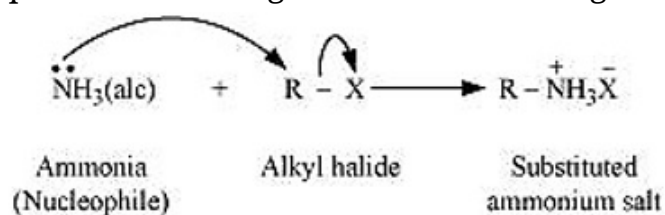
 Benzenediazonium chloride + Phenol $\xrightarrow{\text{OH}^-}$ *p*-Hydroxyazobenzene (Orange dye) + Cl^- + H_2O



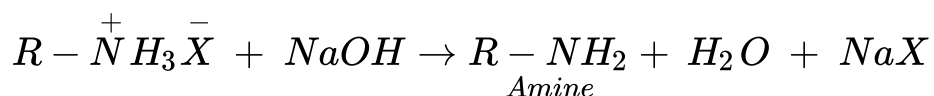
 Benzenediazonium chloride + Aniline $\xrightarrow{\text{OH}^-}$ *p*-Aminoazobenzene (yellow dye) + Cl^- + H_2O

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process of cleavage of the carbon-halogen bond is known as ammonolysis.



When this substituted ammonium salt is treated with a strong base such as sodium hydroxide, amine is obtained.



Though primary amine is produced as the major product, this process produces a mixture of primary, secondary and tertiary amines, and also a quaternary ammonium salt as shown.

