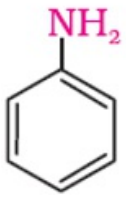
CBSE Test Paper - 05

Class - 12 Chemistry (Amines)

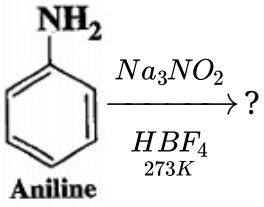
1. Which of the following is a secondary amine?
   a. N,N-dimethylaniline
   b. 3 – pentanamine
   c. N-ethyl propan -1-amine
   d. cyclohexylamine
2. The following amine is called as



   a. Nitrobenzene
   b. Aniline and phenylamine
   c. Aniline and o-toluidine
   d. O - Toluidine
3. Which gives a primary amine upon reduction?
   a. CH_3CH_2NC
   b. $C_6H_5N = NC_6H_5$
   c. $CH_3CH_2 - O - N = O$
   d. $CH_3CH_2NO_2$
4. When pentanal reacts with ethylamine under conditions of acid catalysis, the major organic product is _____.
   a. a ketone
   b. a hydrazone
   c. a nitrile
   d. an imine
5. Esterification is the reaction of one of the below compounds with alcohol:
   a. Carboxylic acids
   b. Ester
   c. Amide

d. Amine

6. Write IUPAC name of a secondary amine having lowest molecular mass.
7. Give one use of tertiary amines.
8. Write IUPAC name of the following compound and classify it into primary secondary and tertiary amine.
   $(CH_3)_2CHNH_2$
9. Why aliphatic amines are stronger bases than aromatic amines?
10. Why do primary amines have higher boiling point than tertiary amine?
11. Write a short note on acetylation.
12. Write structure and IUPAC names of:
    i. The amide which gives propanamide by Hoffmann bromamide reaction.
    ii. The amine produced by the Hoffmann degradation of benzamide.
13. Write the reactions of
    i. aromatic and
    ii. aliphatic primary amines with nitrous acid.
14. Complete the following reaction:



15. Give one chemical test to distinguish between ethylamine and aniline.

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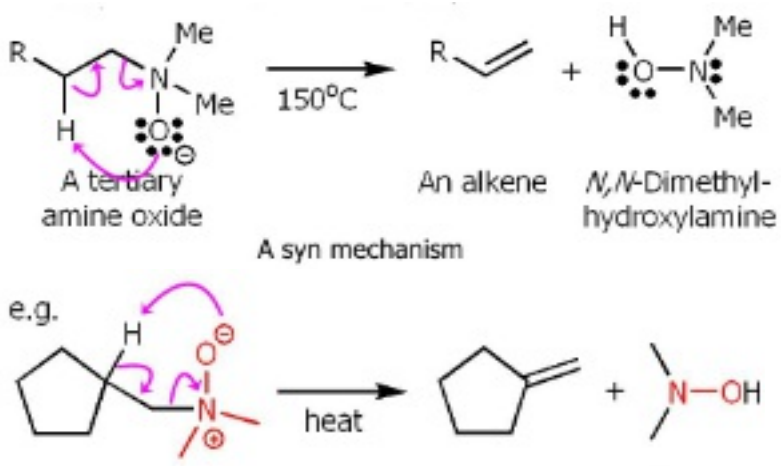
Solutions

1. (c) N-ethyl propan -1-amine

   Explanation: This is secondary amine because nitrogen is connected to 2 carbon atoms directly.



2. (b) Aniline and phenylamine

   Explanation: $C_6H_5NH_2$ is known as aniline. Here, the amino group is directly attached to phenyl ring so it is also known as phenylamine. This is an aromatic primary amine.

3. (d) $CH_3CH_2NO_2$

   Explanation: A primary nitro compound on reduction will give primary amine. The reduction can be done using Fe/HCl or Sn/HCl

4. (d) an imine

   Explanation: This will yield imine. Imines are typically prepared by the condensation of primary amines and aldehydes and less commonly ketones: $RNH_2 + R'C(O)R \longrightarrow RN=C(R')(R) + H_2O$

5. (a) Carboxylic acids

   Explanation: Carboxylic acids react with alcohol in acidic medium to form sweet smelling compounds called esters, this reaction is called esterification reaction.

   $CH_3COOH + CH_3OH + H^+ \rightarrow CH_3COOCH_3 + H_2O$

6. N- Methylmethanamine

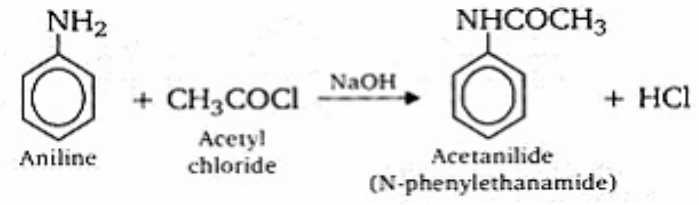
7. Tertiary amines like trimethylamine are used as insect attractants.

8. Propan-2-amine (1°)

9. Aliphatic amines are stronger bases than aromatic amines due to electron releasing nature of alkyl groups in aliphatic amines leading to high electron density on the nitrogen atom whereas in aromatic amines electron withdrawing nature of the aryl group makes them less basic.

10. In primary amines, hydrogen bonding is predominant as there are two hydrogen atoms available for hydrogen bond formation and therefore, they boil at the higher temperature. Tertiary amines do not have hydrogen bonding due to the absence of hydrogen atom available for hydrogen bond formation.

11. **Acetylation:** The process in which an aliphatic or aromatic primary and secondary amines react with acid chloride, anhydrides and esters to form amides is called acetylation. In this reaction, the replacement of hydrogen atom of NH_2 or >N-H group by acyl group takes place in the presence of a base.

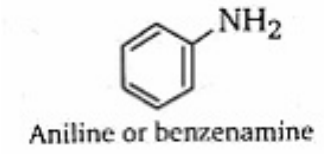


12. i. Propanamine contains three carbons. Hence, the amide molecule must contain four carbon atoms. Structure and IUPAC name of the starting amide with four carbon atoms is as follows:

$$CH_3CH_2 - CH_2 - \underset{\underset{O}{\|}}{C} - NH_2$$

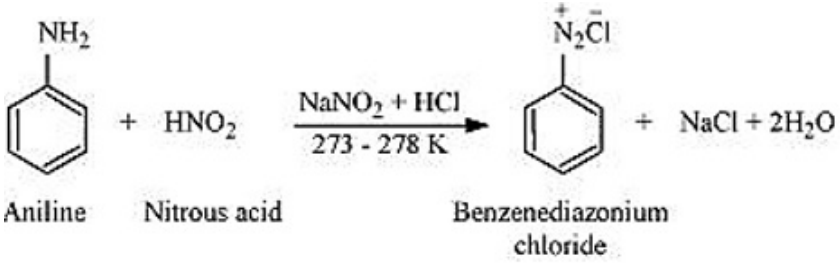
Butanamide

ii. Benzamide is an aromatic amide containing seven carbon atoms. Hence, the amine formed from benzamide is aromatic primary amine containing six carbon atoms.

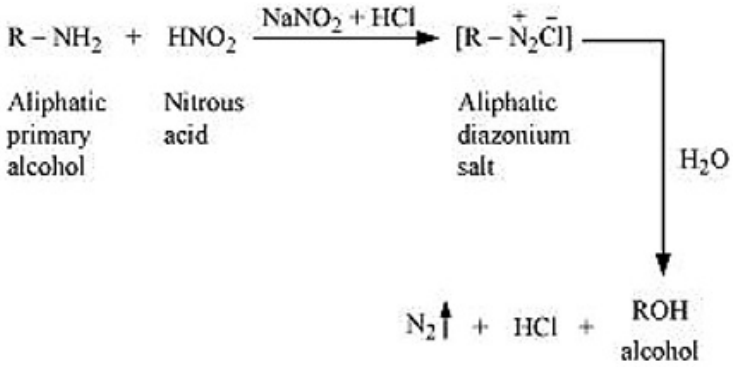


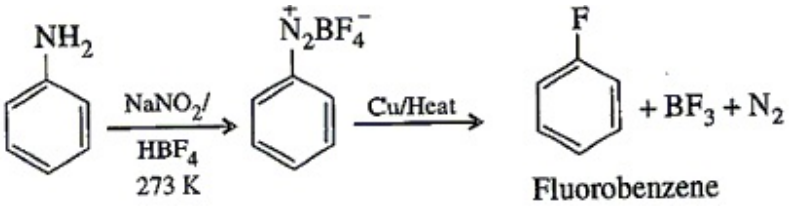
13. i. Aromatic amines react with nitrous acid (prepared in situ from $NaNO_2$ and a

mineral acid such as HCl) at 273 - 278 K to form stable aromatic diazonium salts, NaCl and H_2O



ii. Aliphatic primary amines react with nitrous acid (prepared in situ from $NaNO_2$ and a mineral acid such as HCl) to form unstable aliphatic diazonium salts, which further produce alcohol and HCl with the evolution of N_2 gas.



14. 

15. Ethylamine and aniline can be distinguished by the azo-dye test. On treating aniline with benzene diazonium salt, orange or red coloured azo-dye is formed which is not formed with ethylamine.