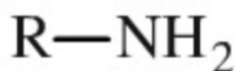


QUALITATIVE TEST FOR AMINES

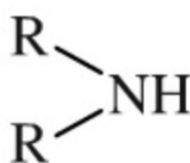
Amines are a class of organic compounds that contain the functional group -NH_2 . The structure of amine is R-NH_2 , where R in the case of aliphatic amine is an alkyl group or for aromatic amines is an aryl group.

Amines are classified as primary, secondary and tertiary amines.

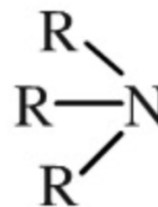
- Primary amines is the one in which the nitrogen atom is bonded to one hydrocarbon atom and two hydrogen atoms.
- Secondary amine is bonded with two hydrocarbon atom and one hydrogen atom.
- Tertiary amines are amines in which all the hydrogen atoms are replaced by hydrocarbon atoms.



Primary Amine



Secondary Amine



Tertiary Amine

Qualitative tests for amines:

1. Litmus paper test
2. Carbylamine test
3. Nitrous acid test
4. Azodye test
5. Hinsberg test

1. Litmus paper test:

- Take the moist red litmus paper.
- Place one to two drops of given organic compound on it.
- Observe the change in the colour of red litmus paper.

Amines are basic in nature. So it turns red litmus paper blue. This test is also not a confirmation test for amines. The chemical reaction is given below.



Note: The change in the color of red litmus paper shows the given organic compound is a base. (May be an amine)

2. Carbylamine test:

This test is also called isocyanide test

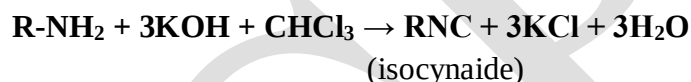
- Take potassium hydroxide solid in a clean test tube and add 2ml of ethanol to it.
- Warm the test tube until the potassium hydroxide dissolves completely in it.
- To this add a few drops of chloroform and shake well.
- To the above mixture add a small amount of the given organic compound to be tested and warm gently.
- Observe the odour of the resulting mixture.

When amines are treated with chloroform in the presence of alkali, isocyanide is formed.

Both aliphatic and aromatic amines give positive for this test.

Secondary and tertiary amines do not give this test.

The chemical reaction is given below.



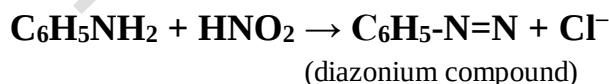
Note: An unpleasant odor confirms the presence of primary amine.

3. Nitrous acid test:

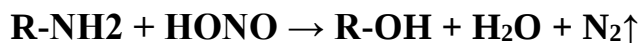
This test can be used to identify primary, secondary and tertiary amines.

- Dissolve the given organic compound in concentrated hydrochloric acid and water in a clean test tube.
- Cool the solution in ice bath for 0-5°C.
- To the cooled solution add sodium nitrite dropwise and mix well.
- Test the solution for the presence of free nitrous acid.
- Add excess of nitrous acid solution if there is an absence of nitrous acid.

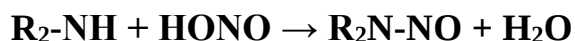
An aromatic primary amine reacts with nitrous acid forms a diazonium salt and at higher temperature they form diazonium compounds undergoes decomposition.



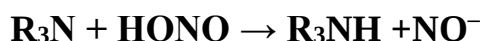
Primary aliphatic amines react with nitrous acid to give **nitrogen gas**, which is seen as **bubbles**.



Secondary amines react with nitrous acid to form a **yellow oily nitrosamine**.



Tertiary amines react with nitrous acid to form **red color soluble nitrite salts**.



Note: Nitrosamines are highly carcinogenic substances.

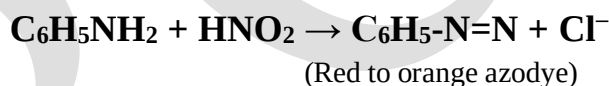
4. Azodye test:

This test is performed in order to confirm the presence of aromatic amines.

- Simultaneously take three test tubes and mark it as A, B and C.
- In test tube A dissolve the given organic compound in 2ml of dilute hydrochloric acid.
- In test tube B prepare aqueous solution of sodium nitrite solution.
- In test tube C dissolve naphthol in dilute sodium hydroxide.
- Place all the three test tubes in an ice bath. Now add the contents in test tube B to the mixture in test tube A.
- The resulting mixture is added to the contents in test tube C.
- Stir the mixture with a glass rod and observe the changes in the test tube.

Aromatic amines form diazonium salts when treated with HNO_2 . These diazo compounds couple with phenols like β -naphthols to form an orange azo dye which is insoluble in water.

The chemical reaction is given below.



Note: The presence of red orange dye confirms the presence of aromatic amines.

5. Hinsberg test:

The reagent used in this test is **benzene sulfonyl chloride**.

- Take the given organic compound to be tested in a clean test tube.
- Add 2ml of sodium hydroxide solution and 1ml of benzene sulfonyl chloride to it.
- Shake the mixture well and add water to dilute the solution.
- Cool the mixture under tap water and observe the formation of precipitate.
- If precipitate formed then treat it with concentrated hydrochloric acid

Amines react with benzene sulfonyl chloride in the alkaline medium.

Primary amines react with benzene sulfonyl chloride to produce substituted sulfonamide which contains acidic hydrogen and dissolve in basic medium.

A secondary amine forms a substituted sulfonamide which is insoluble in alkali because it does not have acidic hydrogen.

A tertiary amine forms a substituted sulfonamide which is insoluble in alkali because it does not have acidic hydrogen.

Note: Tertiary amines: No reaction or precipitate, on adding concentrated hydrochloric acid insoluble material is seen.

Secondary amines: Precipitate in test tube but does not dissolve in concentrated hydrochloric acid.

Primary amines: Precipitate in the test tube but dissolves in concentrated HCl.

