

Distinguishing Tests between Aldehydes and Ketones:

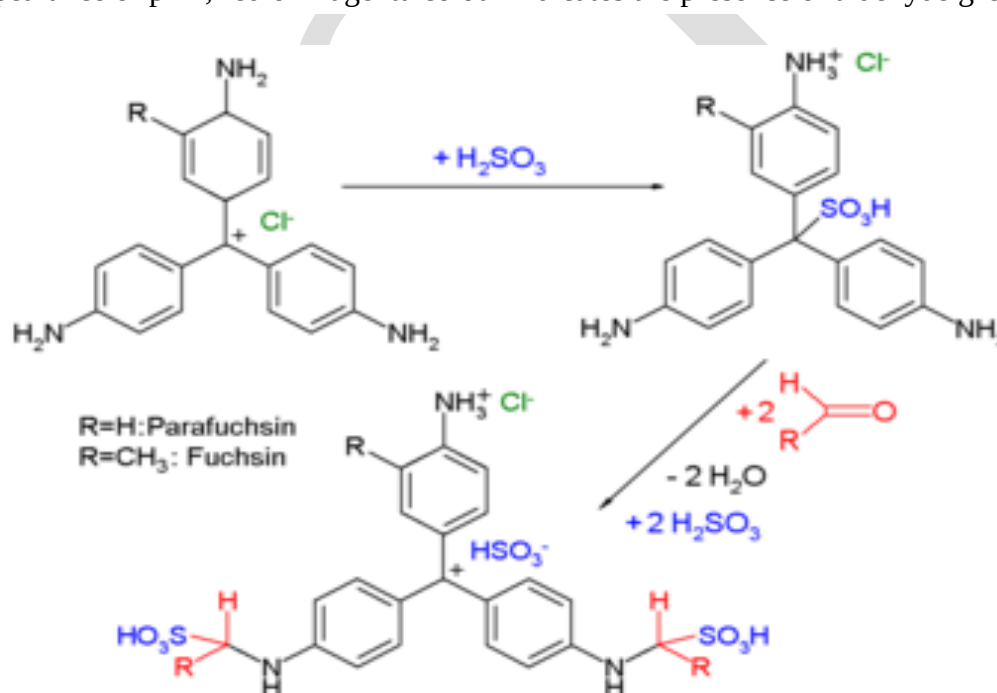
1. Schiff's Test:

- Take the given organic compound to be tested in a clean test tube.
- Add 2-3 drops of Schiff's reagent.
- If there is instant pink or red color formation then the presence of aldehyde is confirmed.

Schiff's reagent is prepared by passing sulphur dioxide into a solution of the dye fuchsin. The solution becomes colourless due to the formation of an additional product. Aldehydes abstract sulphurous acid from Schiff's reagent and restore the pink colour. The colouration is due to the formation of complex compound. Ketones, in general, do not respond to this reaction.

The reaction should not be subjected to heat. Some ketones give a light pink colour with Schiff's reagent therefore light pink colour formation is not a positive test.

Note: Appearance of pink, red or magenta colour indicates the presence of aldehyde group.



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2. Fehling's Test:

- Fehling's solution is prepared by mixing equal amounts of Fehling's A and Fehling's B solution.
- Take the given organic compound in a clean test tube.
- Add Fehling's solution to it and heat the solution gently.
- If a brick-red precipitate appears, then the presence of aldehyde is confirmed.

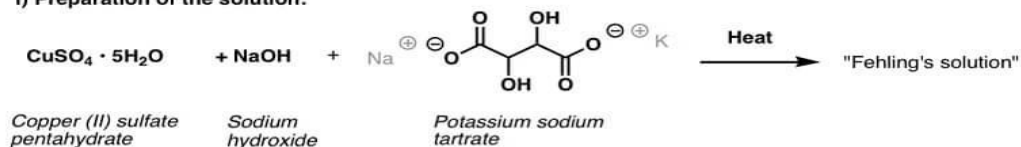
Fehling's solution is a complex compound of Cu^{2+} . When the aldehyde compound is treated with Fehling's solution Cu^{2+} is reduced to Cu^+ and the aldehyde is reduced to acids. During the reaction, a red precipitate is formed.

Aromatic aldehydes do not respond to Fehling's test. An aqueous solution of the compound may be used instead of an alcoholic solution. Formic acid also gives this test.

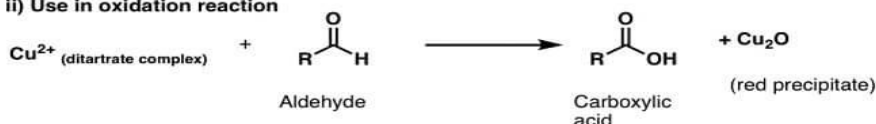
Note: The appearance of red precipitate confirms the presence of an aldehydic group.

Fehling's solution

i) Preparation of the solution:



ii) Use in oxidation reaction



3. Tollen's Test or Silver Mirror Test:

- Take 1ml of silver nitrate solution in a clean test tube.
- Add dilute sodium hydroxide solution to it, and a brown precipitate forms.
- Add dilute ammonia solution drop wise till the brown precipitate of silver oxide dissolves.
- To this freshly prepared Tollen's reagent, add the given organic compound to be tested.
- Place the test tube in a warm water bath for about 5 to 10 minutes.
- If there is the appearance of a silver mirror on the sides of the test tube confirms the presence of an aldehyde.

This test is also called the silver mirror test. Tollens reagent consists of silver ammonia complex in ammonia solution. Aldehydes react with Tollens reagent giving a grey-black precipitate or a silver mirror. Always a freshly prepared Tollen's reagent should be used. Aldehydes are oxidised to the corresponding acids, and silver in Tollens reagent is reduced from +1 oxidation state to its elemental form. Generally, ketones do not respond to this test.

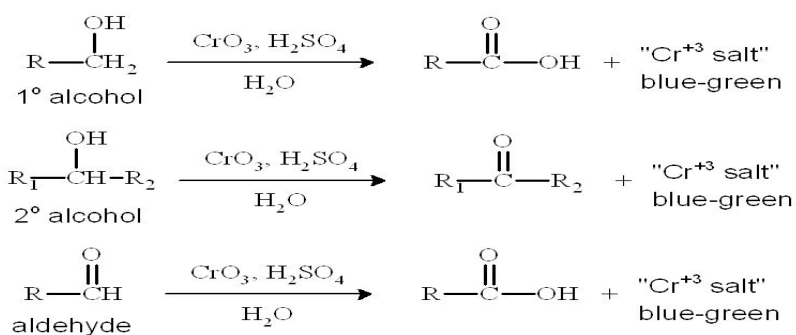


Note: The appearance of a shiny silver mirror confirms the presence of aldehydes.

4. Test with Chromic acid:

- Take the given organic compound in a clean test tube.
- Add 1ml of chromic acid reagent to the given organic compound.
- The appearance of a green or blue colour precipitate indicates the presence of aldehydes.

Aldehydes react with chromic acid and give a green to blue precipitate. Ketones do not react with chromic acid. Some of the primary and secondary alcohols also give this test but they do not give the dinitrophenylhydrazine test.

Chromic Acid Test

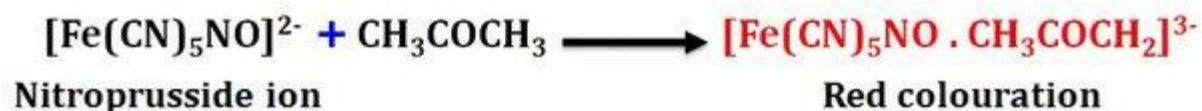
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Note: The appearance of green or blue colour precipitate confirms the presence of aldehydes.

5. Sodium Nitroprusside Test:

- Dissolve sodium nitroprusside in distilled water in a clean test tube.
- Add 1ml of the given organic compound to be tested.
- Shake well and add sodium hydroxide solution drop wise.
- If there is the appearance of red color then the presence of ketone is confirmed.

Ketone responds to this test. Ketone reacts with alkali and forms an anion which further reacts with sodium nitroprusside and forms a colored complex ion. Aldehydes do not respond to this test.



Note: The appearance of red coloration shows the presence of ketone.