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Review Article on Chemical Test of Crude Drugs

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ABSTRACT

Article on Some Important chemical test of Crude Drugs, important chemical test are Explained in the following crude drugs. Chemical test are important to find out the presence of crude drug the chemical test are performed practically .Quality and composition can also be understand by chemical test. Explanation of various test for specific crude drug, some examples of chemical test are Pale Catechu, Acacia, and Gelatin etc.

Keywords : Chemical Test, Sulphuric Acid, Matchstick Test

Pale Catechu :

- **Gambier fluorescin test:** Boil a little powdered drug with alcohol, Filter and add sodium hydroxide solution to the filtrate, stir and add few ml of light petroleum. Petroleum layer shows green Fluorescence.
- **Matchstick test:** dip the wooden matchstick in the solution of drug and dry it over a flame. Moisten the stick with hydrochloric acid and Warm. Purple colour appears on the matchstick due to conversion of Catechu into Phloroglucinol.
- **Vanillin hydrochloric acid test:** Make solution containing vanillin 1ml, alcohol 10ml and dilute hydrochloric acid 10ml, it gives pink Or Red colour due to the formation of Phloroglucinol.
- Heat about 0.5gm of powdered drug with 5 ml of chloroform in a Dish and evaporate the filtrate on a water bath. A greenish yellow Residue is left due to the presence of chlorophyll in the drug.
- With ferric chloride solution it gives bluish black colour.
- Lime water gives brown color with aqueous solution of black catechu.

Acacia:

- Solution of lead sub-acetate gelatinizes aqueous solution of Indian Gum.
- Mount a small quantity of acacia powder in ruthenium red solution and examine under microscope. The particles do not get red colour.

- To 0.1 g of powder, add 1 ml of N/50 iodine. The mixture does not acquire crimson colour.
- Hydrolyse the aqueous solution of gum acacia in presence of dilute Hydrochloric acid by boiling. To it add Fehling's A and B and heat Again. Red precipitate is observed, which confirms the presence of reducing sugar as the product of hydrolysis.
- To the aqueous solution of gum acacia, add 0.5 ml solution of Hydrogen peroxide and 0.5 ml solution of benzidine in alcohol (1% Solution), shake it well. A blue colour is produced (due to oxidase Enzyme)
- Aqueous solution of drug is treated with dilute hydrochloric acid & Heated. To it barium chloride solution is added. No precipitate is formed

Gelatin:

- Aqueous solution of drug gives precipitate with solution of Trinitrophenols and solution of tannic acid.
- On heating gelatin solution with soda lime, ammonia gas is evolved.
- Aqueous solution of gelatin precipitates mercuric nitrate solution forming white colour, which turns black-red on heating.
- Formaldehyde makes gelatin hard & insoluble after drying.
- To aqueous solution of drug, add drop of picric acid or tannic acid Solution, precipitate is produced.

Wool:

- Wool is insoluble in 66% sulphuric acid, concentrated hydrochloric Acid and cuoxam reagent.
- When lead acetate is added to a solution of wool in caustic soda, a Black precipitate is formed due to high Sulphur content.
- Wool hairs are soluble in 1.25 M sodium hydroxide solution.
- Wool is stained with ammonical copper oxide solution.
- Moisten the wool fibres with N/50 iodine solution followed by a drop of 80% w/w sulphuric acid, a yellow colour is produced.
- Warm/ boil wool fibres with picric acid. Then rinse with water, Permanent yellow stain is produced.
- Warm with Millons reagent, red stain is produced.

Turmeric:

- Powdered drug with sulphuric acid gives crimson colour.
- The aqueous solution of turmeric with boric acid gives reddish colour which on addition of alkali changes to greenish blue.
- With acetic anhydride and concentrated sulphuric acid, it gives violet colour, when this test is observed under U.V. light, red fluorescence is seen.
- Prepare a tincture of turmeric and impregnate a filter paper with it. Treat the impregnate Paper with borax solution, a green colour is produced.
- Take powdered turmeric in a test tube or on slide and add a solution of sodium hydroxide or potassium hydroxide, the powder gives red to violet colour.

IPECACUHANA:

- Mix 0.5 g of powdered Ipecacuanha with 20 ml of HCl and 5 ml of water, filter and to 2 ml of the filtrate, add 0.01 g of potassium chlorate; a yellow color appears, gradually changing to red on standing for one hour.

CASTOR OIL:

- Dissolve one gm of shark liver oil in 1 ml of chloroform and treated with 0.5ml of sulphuric acid .it acquires light violet colour ,changing to purple and finally violet colour,

changing to purple and finally to brown colour due to vitamin A.

Agar:

- Boil 1 % solution of Agar. On cooling It forms a stiff jelly.
- When mounted in solution of ruthenium red and examine under microscope, the mounted particles acquires pink colour.
- To 0.2% solution of agar in water, add solution of tannic acid no precipitate is produced.
- When N/50 iodine solution is added to the powder, it produces crimson to brown colour.
- Agar is incinerated to ash, dilute hydrochloric acid added and observed under microscope. Skeletons and sponge spicules of diatoms are seen.
- On warming a little agar in solution of KOH, canary yellow colour is produced.
- Hydrolyse 1% aq. solution of agar with 0.5 ml of Conc. HCL. Divide this hydrolyse solution in to two parts
  - Part A: to this part add 1 ml of Fehling's solution A and B and warm on water bath, colour of the Fehling's solution reduced
  - Part B: To this part add solution of barium chloride, white precipitate of barium sulphate is produced.

Asafoetida:

- Fractured surface of the drug, if treated with sulphuric acid forms red or reddish brown colour.
- When treated with 50% of nitric acid, the drug gives green colour.
- When triturated with water, it forms yellowish orange emulsion.
- Umbelliferon test: Triturate about 0.5g of drug with sand and 5ml of hydrochloric acid, to it add little quantity of water, filter and to the filtrate add equal volume of ammonia. A blue fluorescence is produced due to presence of umbelliferon

Honey:

- Stir 10ml of honey with 5ml of solvent ether for 5-10 minutes, allow it separate and draw off 2ml of ethereal layer into a small petridish. Allow ethereal layer to evaporate, to the residue add 1 drop of resorcinol in hydrochloric acid, pure honey should not give cherry red colour. As artificial honey contains furfural it gives red colour.
- **Fehling's Test:** Take 2 ml of aqueous solution of honey and to it add Fehling's solution A and B .The reaction mixture is heated on a steam bath for 5-10 minutes .A brick red colour is produced due to presence of reducing sugars.
- **Benedict's test:** To 1 ml of aqueous solution add 2 ml (10 drops) of Benedict's reagent (CuSO4).The solution is then heated in a boiling water bath for 3-5 minutes. Reddish precipitate is observed
- **Molisch's Test:** To 2 ml of aqueous solution of honey add 5 drops of Molisch's reagent mix well and add 2ml of Conc. H2SO4 from the side of the test tube. Violet/purple ring is observed at the junction of two liquids.
- **Tommer's Test:** To 2 ml of aqueous solution of honey add tommers reagent (NaOH+CuSO4), boil for 2 minutes & cool. Red colour is observed.
- **Barfoed's Test:** To 2 ml of aqueous solution of honey add Barfoed's reagent, boil for 2minutes & cool. Brick red precipitate is observed.

Benzoin:

- To a solution of benzoin in alcohol add water. Solution becomes milky & acidic to litmus
- To the drug add solvent ether, decant ether layer & to it add 2/3 drops of H2SO4
  - A deep reddish brown colour in case of Sumatra Benzoin.

  - A deep purplish-red colour in case of Siam Benzoin.
- Heat Benzoin in a test tube with solution of KmnO4, it develops Strong odour of benzaldehyde.
- To the alcoholic solution of Benzoin add FeCl3, Green colour develops in case of Sumatra Benzoin.
- Heat small quantity of benzoin in dry test, cover the opening of test tube with clean dry glass slide, cool it and observe glass slide under microscope, cinnamic acid crystals are observed.

Tragacanth:

- When warm with NaOH solution gives a canary yellow colour
- With iodine solution gives green colour
- With ruthenium red particles does not acquire pink colour
- Aqueous solution of tragacanth produces a white precipitate with lead acetate solution.
- Hydrolise the aquous solution of tragacanth with dil Hcl by boiling in water bath. Cool it add equal quantity of fehlings solution A and B, heat again,red precipitate is observed.

Starch:

- Boil 1 g of starch with 15 ml of water and cool. The transluscent viscous jelly is produced.
- The above jelly turns deep blue by the addition of solution of iodine.
- The above blue colour disappears on warming and reappears on cooling.
- Hydrolyse the starch solution with acid and then add Fehling's solution A and Fehling's solution B in equal quantity and heat it in water bath which gives brick red ppt.
- To the solution Of starch add Molisch reagent and add H2 SO4 from the side of test tube.

Shark liver oil:

- Dissolve 1gm of shark liver oil in 1ml of chloroform and treat with 0.5ml of sulphuric acid. It acquires light violet colour, changing to purple and finally to brown (due to Vitamin A).
- Dissolve 1ml of shark liver oil in 10 ml of chloroform and treat with saturated solution of antimony trichloride in chloroform. Shake it well. A blue colour is developed (due to Vitamin A)

Kaolin:

- Heat the kaolin on charcoal block with cobalt nitrate. It results in a blue mass due to alumina.
- Fuse 1gm of Kaolin with 2gm anhydrous sodium carbonate, warm with water and filter. Acidify the filtrate with hydrochloric acid, dilute and warm. Residue of silica is obtained, the solution after neutralization gives reactions characteristic to aluminum

Myrrh:

- When triturated with water it forms a yellowish emulsion.
- Extract small quantity of powdered Myrrh with ether and evaporate the solvent in such a way that a thin film of the resin is left in the dish. Pass the vapors of bromine or fumes of nitric acid over the film. A deep violet colour is produced.

Black catechu:

- With ferric chloride solution it gives bluish black colour.
- Black catechu gives pink or red colour with vanillin hydrochloric acid solution.
- Lime water gives brown color with aqueous solution of black catechu.
- Matchstick test: dip the wooden matchstick in the solution of drug and dry it over a flame. Moisten the stick with hydrochloric acid and

warm. Purple colour appears on the matchstick

Ergot:

- To defatted ergot powder add 50% potassium hydroxide solution and heat at 1700C for 1hrs, cool, wash thoroughly with alcohol and to it add first iodine solution and then 20% sulphuric acid, violet colour is produced.
- Extract about 1gm of powdered ergot with 10ml of solvent ether along with 0.5ml of dilute sulphuric acid. Filter the extract and to the filtrate add about 1ml of cold saturated solution of sodium bicarbonate. The aqueous layer becomes red or violet (due to Sclererythrin).
- In UV light, ergot powder shows red fluorescence.
- Extract ergot with chloroform and sodium carbonate and to extract add paradimethylaminobenzaldehyde, 35% sulphuric acid and 0.5% ferric chloride solution. A blue colour is produced. (Ergotoxin test)

NUX VOMICA SEED:

- **Strychnine Test:** A mixture of ammonium vandate and sulphuric acid on Addition to strychnine or a thick section of endosperm gives purple colour.
- Potassium Dichromate Test: Addition of potassium dichromate and conc.H2SO4 with strychnine forms violet color.
- **Brucine Test:** Addition of conc. HNO3 to brucine or thick section of endosperm produces yellow to orange colour.

ALOES:

- For carrying out the tests a clear solution of aloe is prepared as follows: Boil 1 gm with 100m] of water, allow it to cool; add 1 gm kieseliguhr, stir, it well and filter through filter paper.
- Borax test: Take 10 ml of solution and add 5 gm of borax and heat. Green colour fluorescence is seen which is due to aloe-emodin anthranol. This test becomes more sensitive, if 5 to 10 drops of this reaction mixture are taken a test tube and tilled with water.
- Bromine Test: Add equal volume of bromine solution to solution of aloe. Bulky yellow precipitate of tetrabromaloin is formed.
- Modified Anthraquinones Test: Take 0.1 gm of drug and add 5ml of 5% solution of ferric chloride and 5ml dilute hydrochloric acid and heat on boiling water-bath for 5 minutes, cool the solution and shake gently with a organic solvent like benzene. Separate the organic solvent layer and add an equal volume of dilute ammonia. A pinkish red colour is formed in ammonical layer. This test is of C. glycoside.
- Cupraloin Test: Dilute 10 ml of the solution of aloe to 10 ml with water and add to it 1 drop of copper sulphate solution. Bright yellow colour is produced. Add 10 drops of saturated solution of sodium chloride. Colour change to purplish. Add 20 drops of 90% alcohol, the purplish colour persist.
- Nitrous acid test: Add few small crystals of sodium nitrite and few drop of dilute acetic acid to 5 ml of solution of aloe. Pink of purplish colour is produced.
- **Nitric acid Test:** Different aloe show different colors with nitric acid:

  (a) Curacao aloe deep reddish –brown

  (b) Socotrine aloe – Pale yellow brown

  (c) Zanzibar aloe- Yellow -brown

  (d) Cape aloe- First brown, changing to green later Nitric acid test can be performed by taking little Coarse drug on while porcelain tile and adding nitric acid to it.

Opium:

- First of all opium is dissolved in water and then ferric chloride solution is added. It results in reddish purple color. The change in color occurs due to presence of meconic acids in opium.
- In another test, when opium is treated with small amount of nitric acid, orange red color is produced. This test occurs due to the presence of morphine in opium

Keller killani test:

- Drug + 10ml of 70% alcohol for few minute and filtered. To 5ml filtrate 10ml of hydrogen peroxide and 0.5 ml of strong solution of lead acetate is added. To this mixture 1 or 2 drop of concentrated sulphuric acid is added. Appearance of blue color confirms presence of deoxy sugar.

Gold beater's skin test:

- Gold beater's skin is a membrane prepared from intestine of Ox .and I behaves similarly to un tanned skin Soak a small piece of Gold beater's skin in 2% hydrochloric acid .Rinse it with distilled water .Place it in solution to be tested for 5 minutes .Wash in water and transfer to 1% solution of ferrous sulphate .Black or brown color of skin indicates presence of tannins It is a quantitative test and +ive only for true tannins.

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