★ Qualitative Test for Phenol:

- There are many tests for detecting the phenolic group. we will discuss 4 of them with principle, procedure and observation.

① Ferric chloride test.

② Litmus test.

③ Libermann's test.

④ Bromine water test.

① Ferric chloride test:

- **principle:** Aq. soln of phenols reacts with Freshly prepared ferric chloride soln to give coloured complex, solution (Blue/ voilet) → colour indicates presence of phenol.

$$6C_6H_5OH + FeCl_3 \longrightarrow [Fe((C_6H_5O)_6]^{-3} + 3HCl + 3H^+$$

phenol — Ferric chloride — violet coloured complex.

- Diff. types of phenol undergo same rean & gives diff. colour.

Reagent: Neutral soln of $FeCl_3$ is prepared by adding dil. NaOH soln. drop by drop untill a small permanant ppt. appears Now filter the soln & use.

procedure:

organic compound dissolve in water.

↓ add few drop of ferric chloride reagent.

observe the change in colour.

observation:

1) phenol, Resorcinol & cresol => violet / Blue
2) catechol → Green colour obtained
3) Hydroquinone → violet / Blue. colour.

② Litmus Test:

principle: As we know the phenol is acidic in nature so it turns the Blue litmus into Red.

Procedure:

place a drop of organic solution (or) a small crystal on moist blue litmus paper.

⇓

Observe the change in colour of paper.

Observation Result:

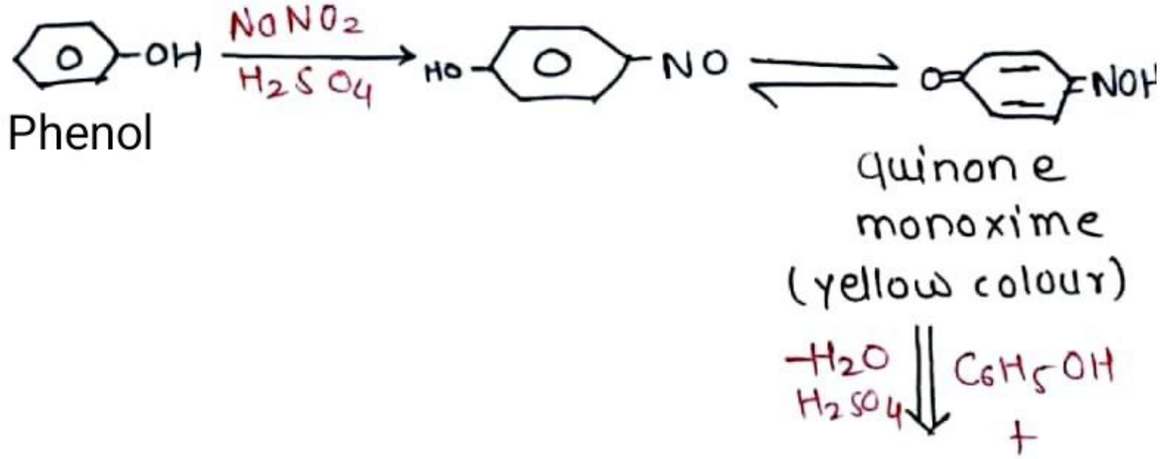
If paper change into Red then the phenol is present.

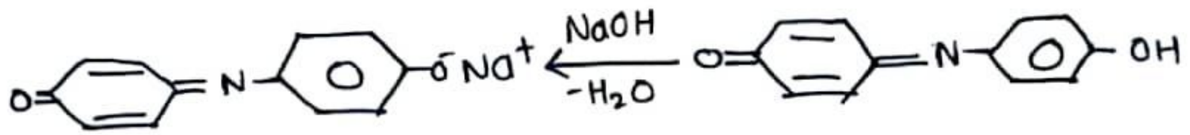
③ Libermann's test:

• Done when para position is free in phenol.

principle:

phenol react with conc. H_2SO_4 & sodium Nitrile ($NaNO_2$) to give quinone monoxime (yellow colour) which further treated with excess phenol & H_2SO_4, gives Indo-phenol (Blue colour) on dilution it changes to Red & further treated to NaOH to give Blue colour salt of Indophenol.





Procedure:

1 ml phenol + Sodium Nitrile soln in a test tube (Yellow colour)

↓ Heat gently & allow to cool + PHENOL

(Blue colour) Add 1 ml conc. H_2SO_4 & shake

↓ dilute the soln with water

⇓

Solution turns Red
(phenol present)

⇓ added NaOH soln (1-2 ml)

Blue coloured soln obtained.

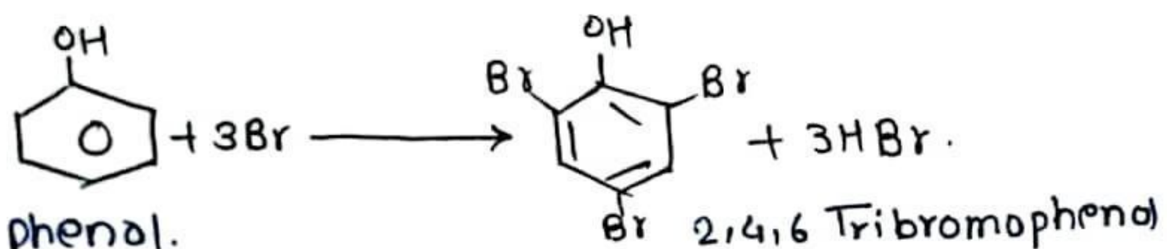
observation:

Deep Blue colour solution obtained i.e. phenol is present)

④ Bromine water Test:

principle:

phenol undergo ES Rean. with Bromine when Bromine H_2O (brown colour) is added to the aq. solution of phenol the Brown colour of Bromine disappears and a white ppt. of 2,4,6 Tribromophenol is formed.



phenol. 2,4,6 Tribromophenol (white ppt)

Reagent:

Take 5 ml of Bromine, add 100 ml of distilled water and shake well.

procedure:

Dissolve sample in Glacial acetic acid

⇓ add bromine water drop wise.

Brown colour disappear and white ppt. form

observation & Result:

present)

Formation of white ppt. shows the presence of phenol.