

Lab (3)
Alcohols and Phenols

1st stage – college of Dentistry

Dr. Amal Shakir

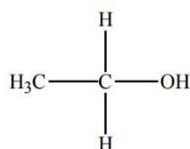


Introduction:

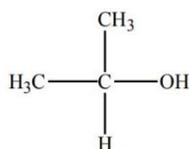
Alcohols are organic molecules that contain a hydroxyl (-OH) group that is directly attached to an alkyl group R-OH.

Alcohols are classified to:

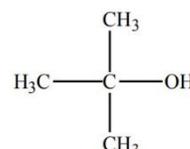
- **Primary alcohol** if the carbon bearing the hydroxyl group is connected to one carbon atom.
- **Secondary alcohol** if the carbon bearing the hydroxyl group is connected to two carbon atoms.
- **Tertiary alcohol** if the carbon bearing the hydroxyl group is connected to three carbon atoms.



A primary alcohol



A secondary alcohol

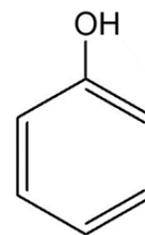


A tertiary alcohol

Phenols are molecules that contain an -OH group that is directly attached to a benzene ring.

Because alcohols contain an -OH group, they are able to form hydrogen bonds to one another. They therefore have high boiling

points. Alcohol can also form hydrogen bonds with water, so small alcohols are water-soluble. The smallest alcohols, methanol (CH₃OH) and ethanol (CH₃CH₂OH), are completely soluble in water in any proportions.

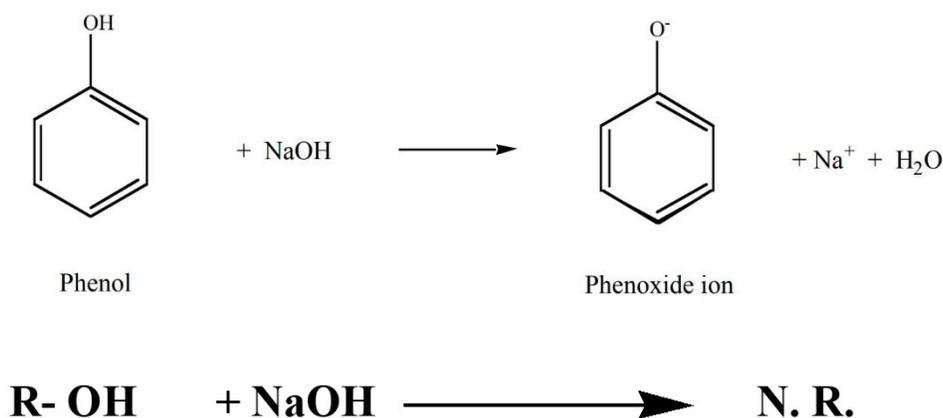


As the hydrocarbon part of an alcohol gets larger, the alcohol becomes less water soluble and more soluble in nonpolar solvents. Phenol is somewhat soluble in water. It acts as a weak acid in water, so a solution of phenol will be slightly acidic.

Reactions:

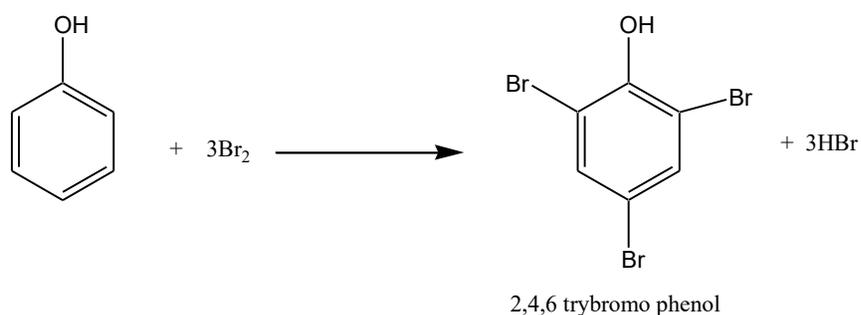
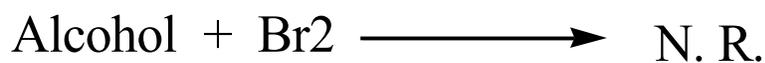
1. With NaOH

Phenols are weak acids – in water, they ionize slightly to form phenoxide ion and hydronium ion, which makes the solution acidic. Because phenols are weak acids, they will react with bases. If phenol is reacted with NaOH (a strong base), it is completely converted to the phenoxide ion, which is soluble in water because it is charged. Phenol itself is not very soluble in water.



Procedure:

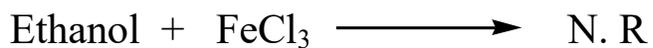
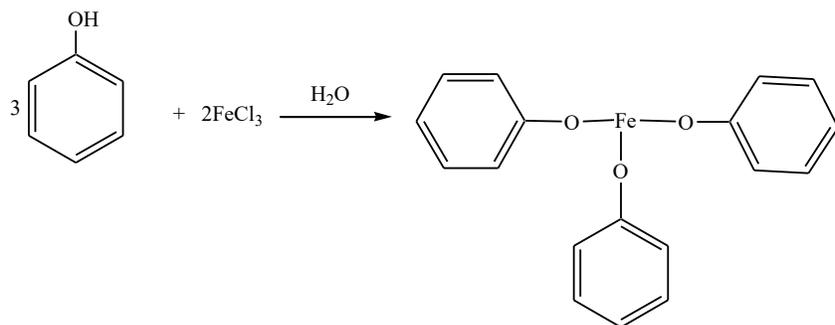
Add some water to a few drops of phenol to obtain a turbid solution (suspension). add dropwise sodium hydroxide until a clear solution is obtained.

2- With Br₂/H₂O• **Procedure:**

To 2 ml of a 2% solution of phenol in water add bromine water drop by drop until a small excess of the reagent is present. Note formation of a precipitate.

3-Reaction with ferric chloride (FeCl₃)

All phenol reacts with ferric chloride, formation red to violet coloured compound:



• Procedure:

- To 2 ml of a 1% solution of phenol in water add few drops of a dilute ferric chloride solution.
- Note formation of a colored compound.

4- Ester formation:

Acetic acid + Alcohol \longrightarrow Ester + Water

