CHEMICAL PROPERTIES OF PHENOL

Phenol gives mainly two types of reactions:

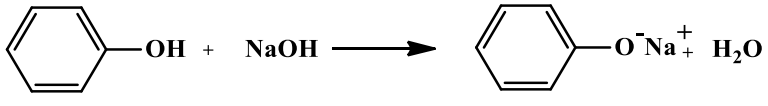
A. Reactions due to –OH group
B. Reactions due to benzene ring

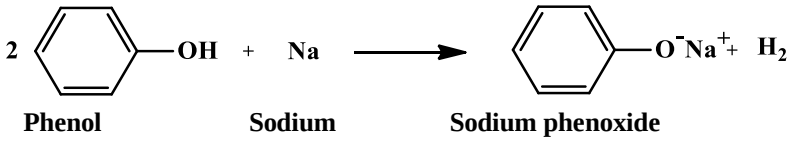
A. Reactions due to the –OH group-

. Reactions of phenols due to –OH group are mainly due to breaking of O-H group.

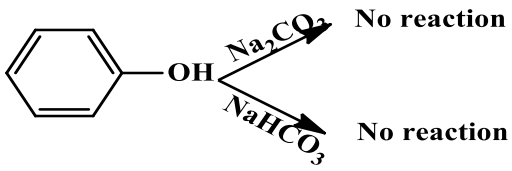
1. Formation of Salt:

Phenol is acidic in nature. It reacts with NaOH or Na metal to form salt.

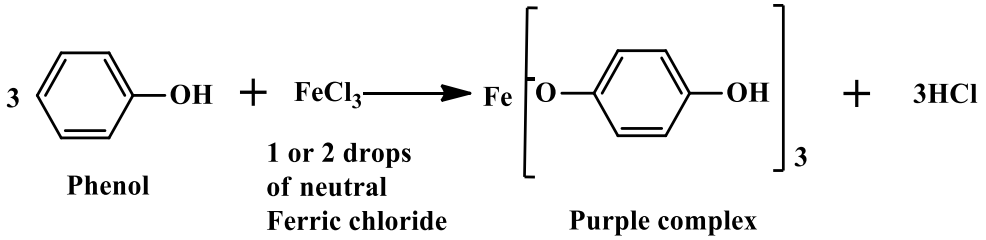




. Phenol is weaker acid than carboxylic acid. It does not react with sodium carbonate and bicarbonates.(Does not liberate carbon di oxide)

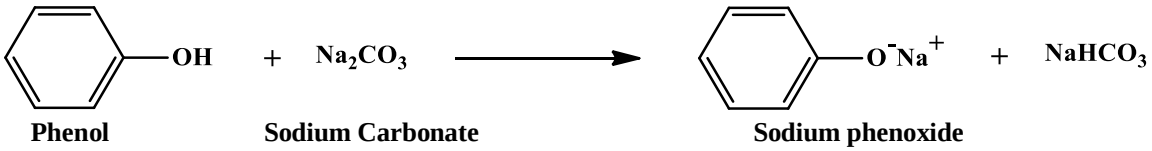


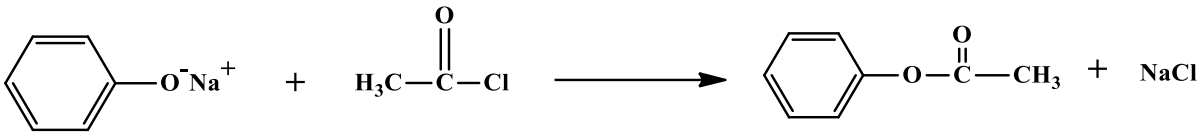
2. Reaction with $FeCl_3$:



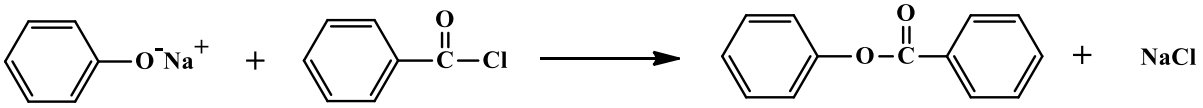
3. Formation of esters (Esterification):

Phenol reacts with acid chlorides (or acid anhydrides) in aqueous alkali solution to give phenyl esters. The alkali first forms the phenoxide ion which then reacts with acid chloride.





Sodium phenoxide **Acetyl chloride** **Phenyl acetate**

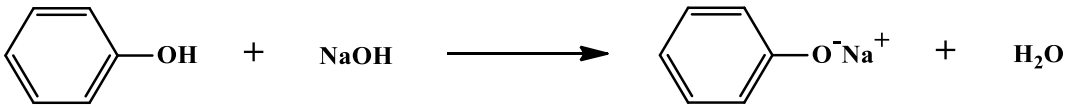


Sodium phenoxide **Benzoyl chloride** **Phenyl benzoate**

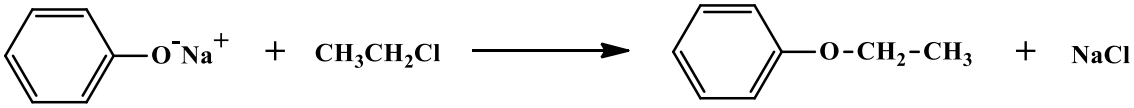
Note: The reaction of phenol with benzoyl chloride is known as **Schotten-Baumann reaction**.

4. Formation of Ether:

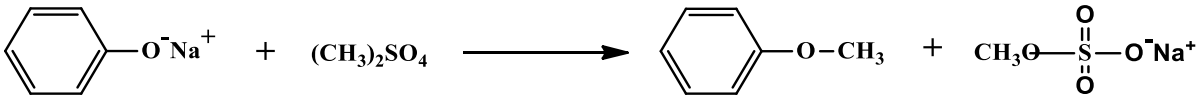
Phenol reacts with alkyl halides in alkali solution to form phenyl ethers. The alkali first forms the phenoxide ion which then reacts with alkyl halide.



Phenol **Sodium hydroxide** **Sodium phenoxide**



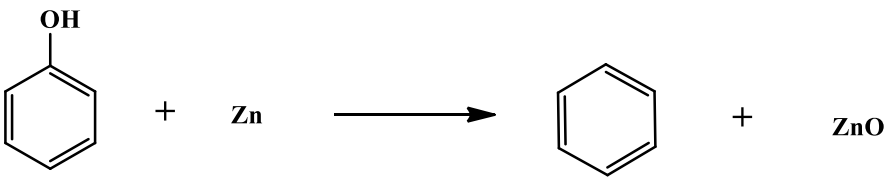
Sodium phenoxide **Ethyl chloride** **Ethoxy benzene (Phenetole)**



Sodium phenoxide **Dimethyl sulphate** **Methoxy benzene (Anisole)** **Sodium methyl sulphate**

Note: Reaction with Zinc dust

When phenol is distilled with Zinc dust, low yield of benzene is obtained.



Phenol **Benzene (low yield)**