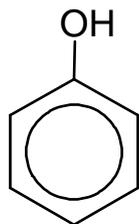
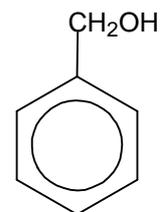


6.95 Phenols



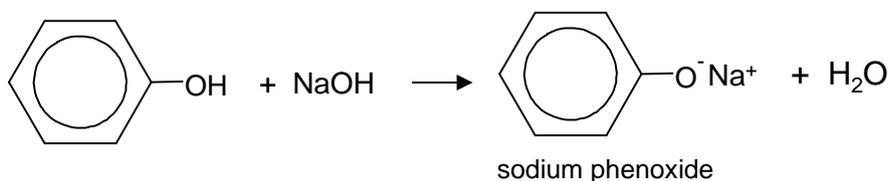
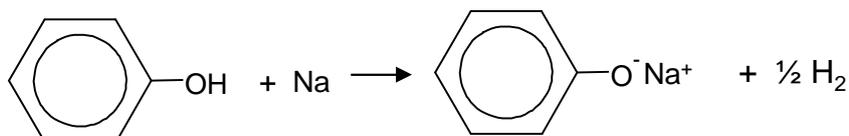
In a phenol the OH group is directly attached to the benzene ring.

In a phenol the lone pair of electrons on the oxygen is delocalised with the electron charge cloud of the arene ring. The delocalised bonding changes the reactivity of the OH group and the arene ring.



This is not a phenol, but is an alcohol because the OH group is attached to an alkyl group rather than the benzene ring.

Phenols are very weakly acidic. They are weaker acids than carboxylic acids. Both phenols and carboxylic acids will react with sodium metal and sodium hydroxide. Only carboxylic acids will react with sodium carbonate as a phenol is not strong enough an acid to react.

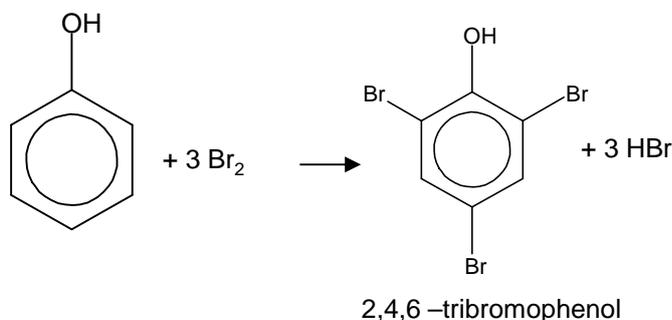


The sodium phenoxide compound is more soluble than the original phenol. So the solid phenol dissolves on addition of NaOH

Reaction of phenol with Bromine

Reagents: Bromine water

Conditions: room temp



Phenol does not need a FeBr_3 catalyst like benzene and undergoes multiple substitution whereas benzene will only add one Br.

The product in this reaction is a white solid

In phenol the lone pair of electrons on the oxygen (p-orbital) is partially **delocalised** into the ring. The electron density increases and the Br_2 is more polarised

Phenols are used in the production of plastics, antiseptics, disinfectants and resins for paints.

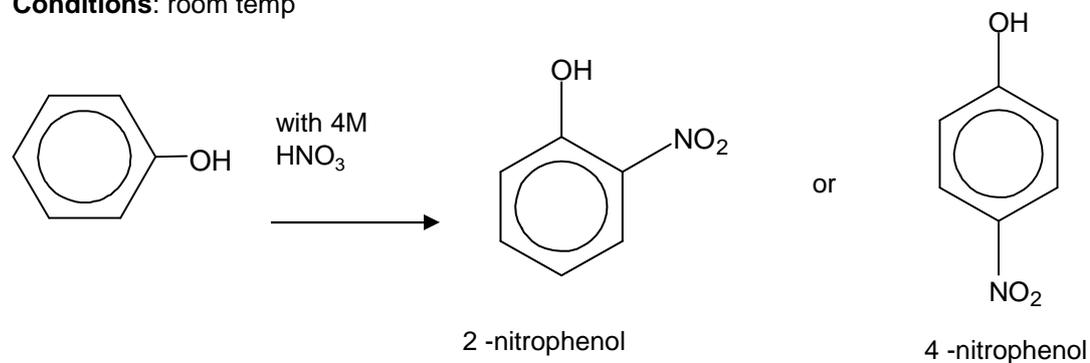
Reaction of Phenol with Nitric acid

In comparison with benzene, phenol does not need the concentrated sulphuric acid catalyst

With 4M HNO_3 single substitution occurs (in comparison to the conc HNO_3 needed for benzene)

Reagent 4M HNO_3

Conditions: room temp



Reaction with acyl chloride

Change in functional group: **phenol** \rightarrow **ester**

Reagent:

Conditions: **room temp.**

