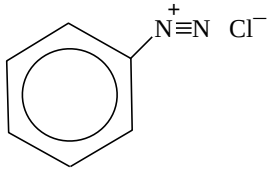
BENZENE DIAZONIUM CHLORIDE

Structure

- has the formula $C_6H_5N_2^+ Cl^-$
- a diazonium group is attached to the benzene ring
- the aromatic ring helps stabilise the ion

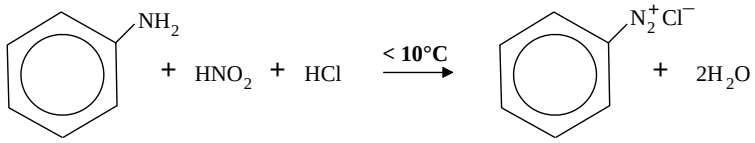


Preparation From phenylamine (*which can be made by reduction of nitrobenzene*)

reagents nitrous acid and hydrochloric acid

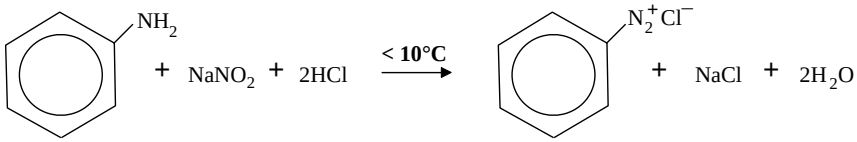
conditions keep below 10°C

equation **$C_6H_5NH_2 + HNO_2 + HCl \longrightarrow C_6H_5N_2^+ Cl^- + 2H_2O$**



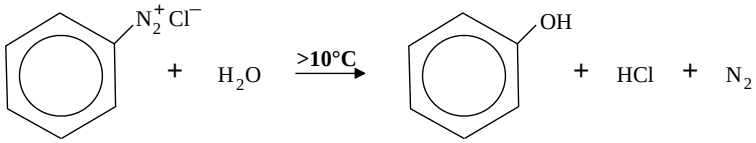
notes nitrous acid is unstable and is made *in situ* from sodium nitrite

$C_6H_5NH_2 + NaNO_2 + 2HCl \longrightarrow C_6H_5N_2^+ Cl^- + NaCl + 2H_2O$



the solution is kept cold to slow down decomposition of the diazonium salt

$C_6H_5N_2^+ Cl^- + H_2O \longrightarrow C_6H_5OH + HCl + N_2$



Reactions Benzene diazonium chloride undergoes two main types of reaction

- **SUBSTITUTION OF THE DIAZONIUM GROUP** *nitrogen expelled*
- **COUPLING REACTIONS** *the nitrogen atoms are retained*

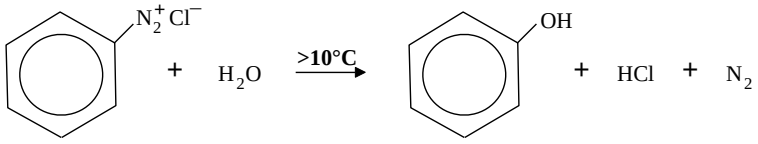
SUBSTITUTION

OH

reagents water **(hydrolysis)**

conditions warm above 10°C

equation



use

- the only reasonably simple way to substitute OH
- phenol is an antiseptic and is used to make polymers

I

reagents potassium iodide solution

conditions warm

equation **$C_6H_5N_2^+ Cl^-$ + KI ——> C_6H_5I + KCl + N_2**

COUPLING

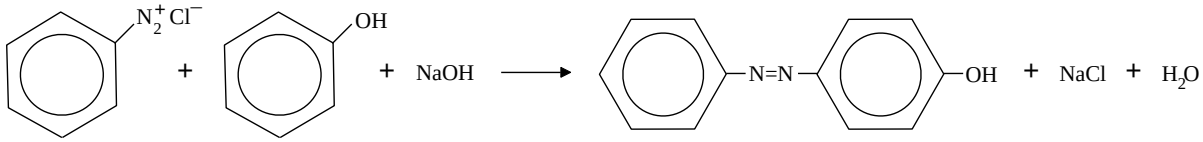
Phenols

reagents **phenol** and **sodium hydroxide**

conditions **alkaline** solution below 10°C

equation

$C_6H_5N_2^+ Cl^-$ + C_6H_5OH + NaOH ——> C_6H_5-N=N-C_6H_4OH + NaCl + H_2O



(4-hydroxyphenol)azobenzene

YELLOW

use making azo dyes

the **-N=N-** is the AZO functional group

Q.1 *Outline a scheme, listing reagents and conditions, for the synthesis of 1,3-diiodobenzene.* ***(n.b. iodine directs to the 2,4,and 6 positions)***