Lecture-16

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- Chemistry of Dyeing
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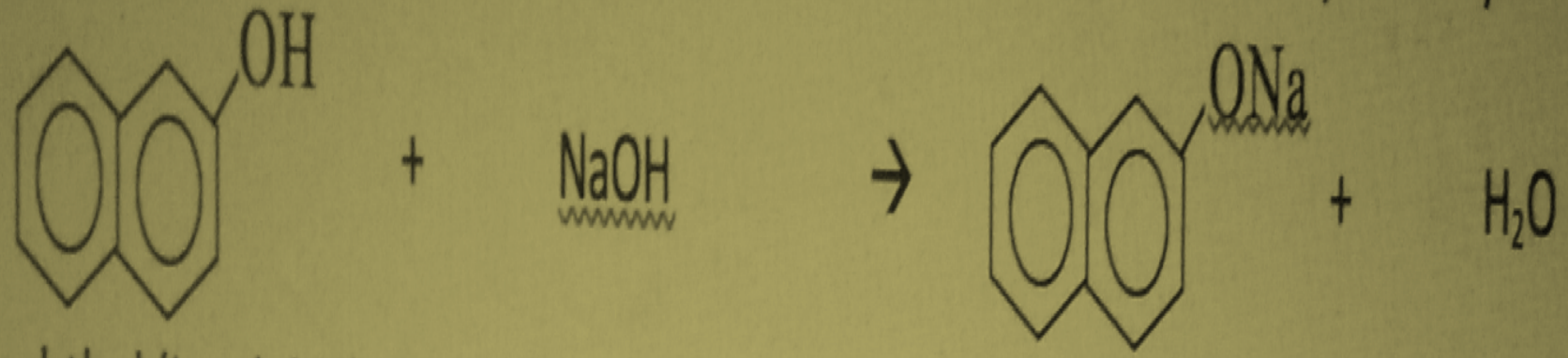
Dyeing with Azoic Color

Chemistry of Dyeing with Azoic Color

Naphtholation:

Naphthols are insoluble in water and they are converted into water soluble compound by treating with alkali.



β-naphthol (Insoluble) Alkali Soluble Na-Salt of β-naphthol

This salt solution is used for the impregnation of fabric.

Dyeing with Azoic Color (Continued)

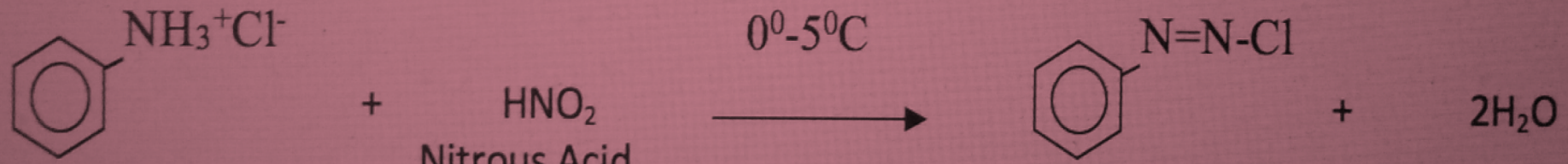
Chemistry of Dyeing with Azoic Color (Continued)

Diazotization:

A base containing amino group ($-NH_2$) reacts with the $NaNO_2$ (Sodium Nitrite) to form a solution of diazonium chloride of that base in presence of excess HCl at 0^0-5^0C temperature.

Aniline (Base)

$NaNO_2 + HCl \rightarrow HNO_2 + NaCl$



Nitrous Acid

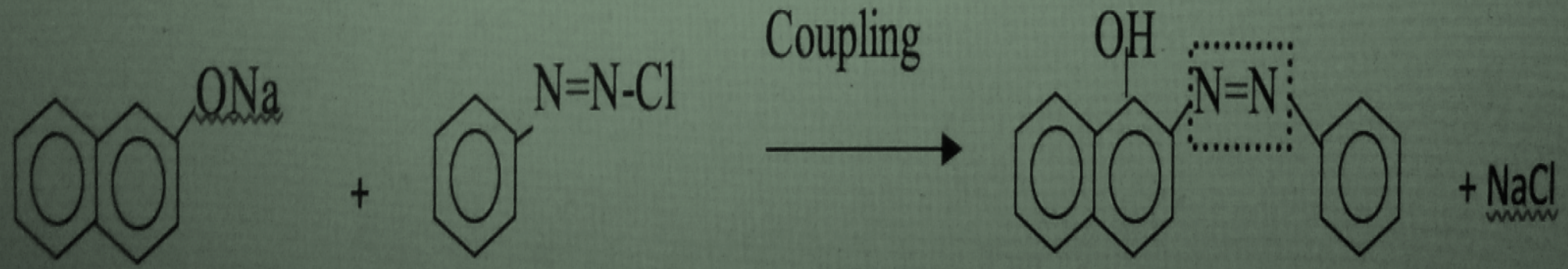
Benzene Diazonium Chloride

Dyeing with Azoic Color (Continued)

Chemistry of Dyeing with Azoic Color (Continued)

Coupling/Developing:

The impregnated material is treated in a bath containing diazonium solution to carry out to coupling and thus color is produced inside the fabric. The pH maintaining is important.



Na-β-Naptholate + Benzene Diazonium Salt → Insoluble Azo Group

Dyeing with Azoic Color (Continued)

Factors considered for diazotisation

1. Amount of HCl and $NaNO_2$: For diazotization, excess amount of HCl and $NaNO_2$ is required. Their presence can be tested by congo red paper and starch iodide paper. Cango red paper terms blue if excess HCl is presence and same happens with starch iodide paper if excess HNO_2 is present.

2. P^H: At the end of diazotisation, the sol^n contain a fairly large amount of HCl. The P^H is raised by using Na-acetate.

$$CH_3COONa + HCl \rightarrow CH_3COOH + NaCl$$

3. Temp: - Lower the temp, better the stability of diazotisation salt sol^n

- Very low temp, increase the cost of maintenance.

4. Metal: Diazonion should be carried out in non metallic vessel other than Stainless steel. Because most metals promote catalytic decomposition.

Dyeing with Azoic Color (Continued)

Factors Considered for coupling

- Concentrate of nephthol sol^{n}.
- Concentrate of base sol^{n} (P^{H} = 6.5, >0.5g/L)
- Temperature of base sol^{n} (20^{o}C)
- Inherent substantivity of naphthol to fabric.
- P^{H} of base Sol^{n} for fast reaction P^{H} should be less.
- Strength of base and naphthol.

- Base to water ratio 1:5
- Presence of alkali binding agent to naturalize excess alkali.
- Color to be produced playing a important role-

  Blue color is obtained quickly

  Yellow color is obtained quickly


Thank
You!