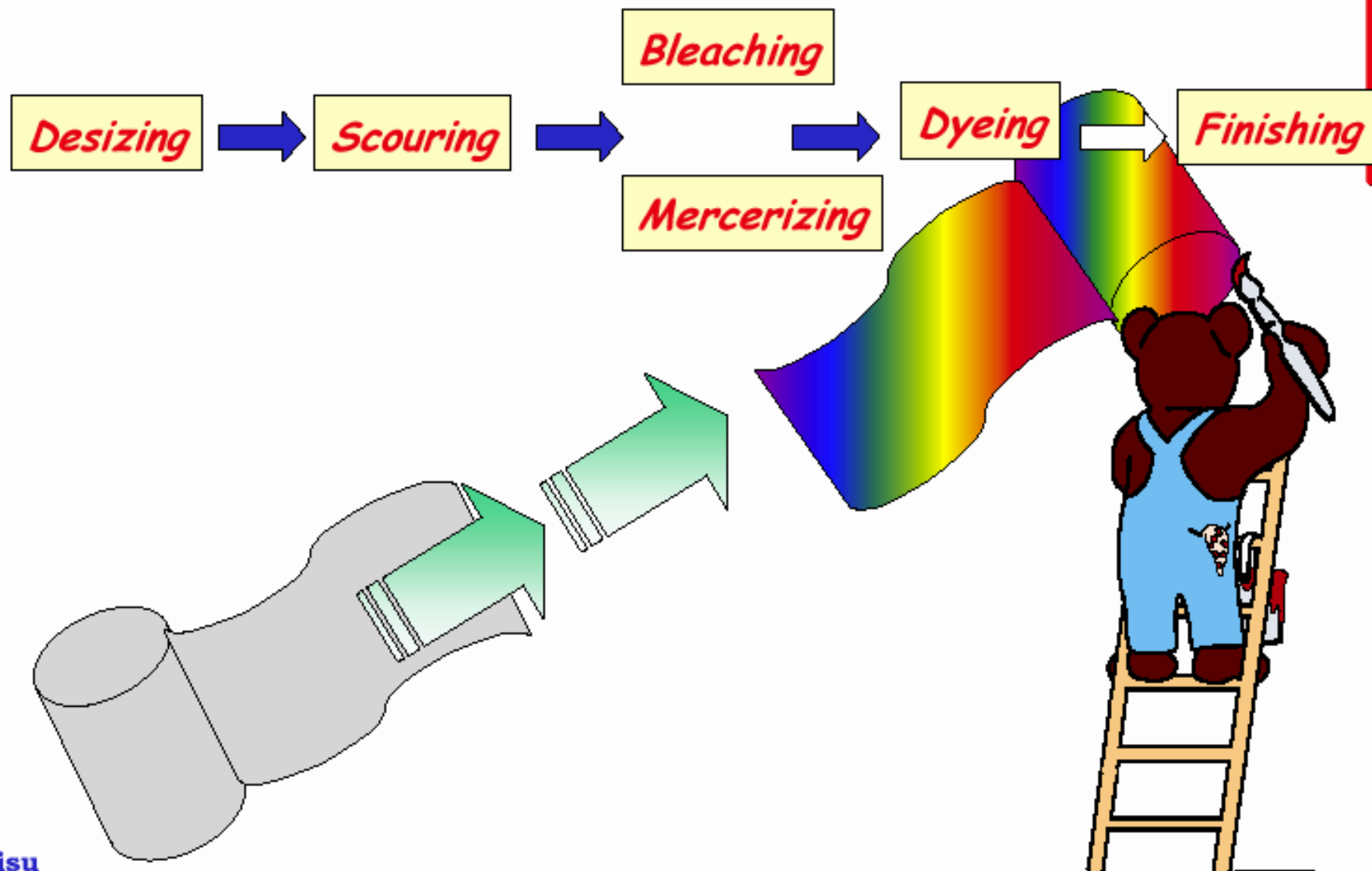


Textile Wet Processing Industry

Major Production Process Steps



Dyeing

- Dyeing is a process of coloring textile materials by immersing them in dye liquor/dye solution (Dyestuff+ Auxiliaries+ water) is called dyeing. However, certain conditions are essential to carry out dyeing process.
- The general theory of dyeing explain, the dyeing process is the interaction between dye, water, auxiliary (electrolyte, dispersing agent, wetting agent) and textile material.

Ingredient of Dyeing



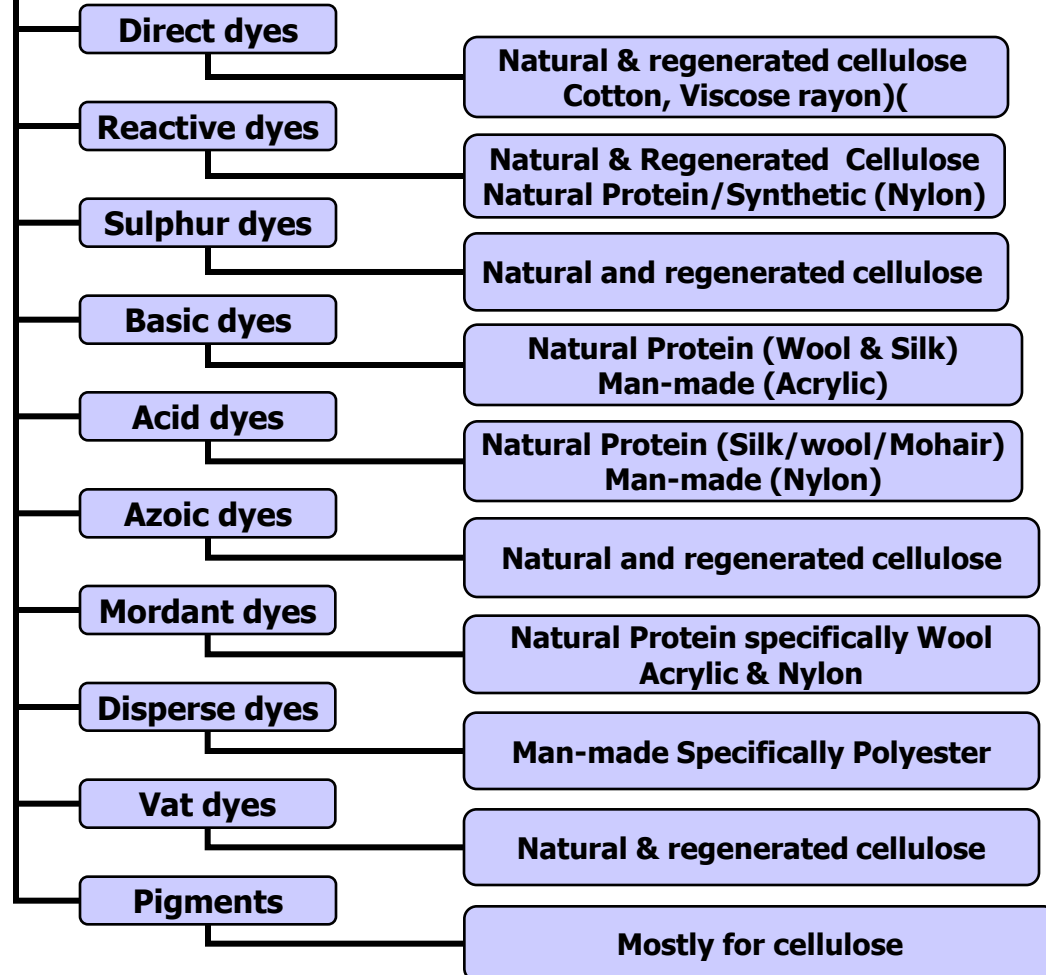
1. Dyes, pigments, colorants
2. Substrate (fiber, yarn, fabric, garment, etc)
3. Auxiliaries (Electrolyte etc. These are helping compound that increase the dyeing properties).
4. Medium (water)

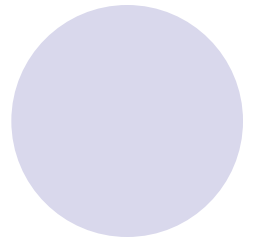
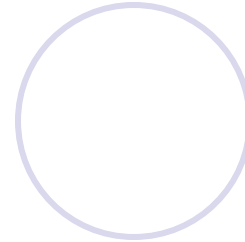
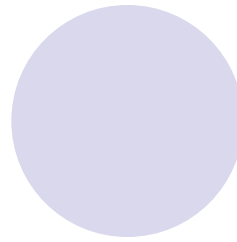
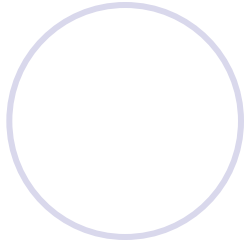
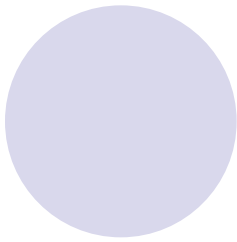
Dye stuff classification



- Dyes can be classified base on the four parameters:
 1. Base on chemical constituent
 2. Base on application or uses
- Base on ionic structure
- Base on solubility in water

Base on Application





Base on Ionic structure

Anionic Dyes

Direct dyes

Reactive dyes

Sulphur dyes

Vat dyes

Acid dyes

Azoic dyes

Mordant dyes

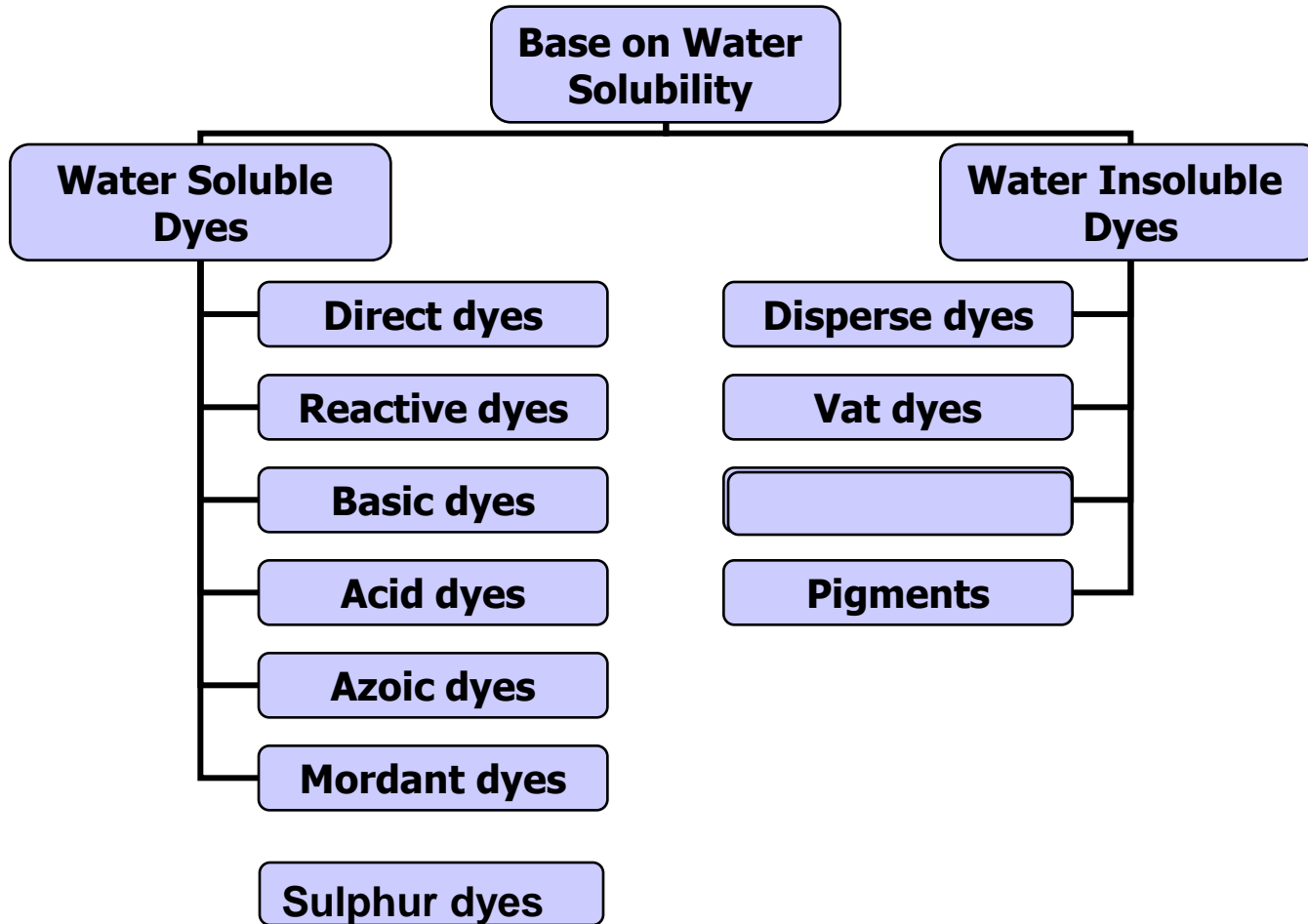
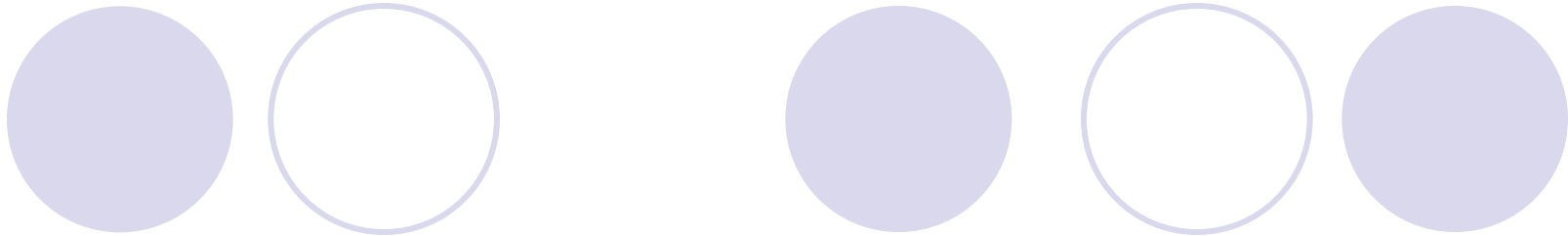
Cationic Dyes

Basic dyes

Non-ionic Dyes

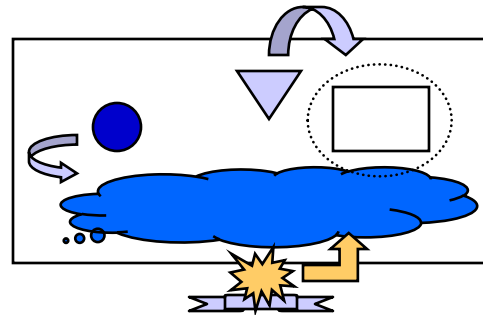
Disperse dyes

Pigments



General Theory of dyeing

- More specifically, it can explain as, following forces are responsible for, dye molecules should leave (migrate) the dye liquor, attach (adsorption), penetrate (absorption), diffused to textile material: i.e



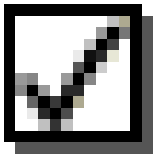
- “Force of repulsion” which develop between dye molecules and water, and “Force of attraction” which develop between dye molecules and textile material.

A decorative header consisting of five circles in a horizontal row. From left to right: a solid light purple circle, a hollow light purple circle, a solid light purple circle, a hollow light purple circle, and a solid light purple circle.

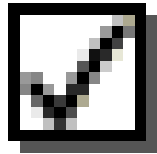
Stages of Dyeing Process

1. Preparation of dyeing solution
2. Actual dyeing (Padding, drying, fixation)
3. Soaping & Washing
4. Drying

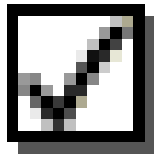
Stages of Dyeing Application



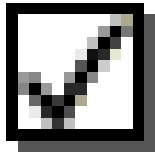
Exhaustion



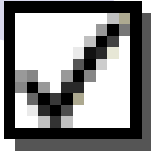
Migration



Diffusion



Fixation



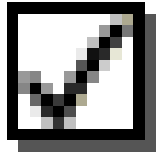
Exhaustion

The leaving of a dye from the dye bath and attach to textiles being dyed.



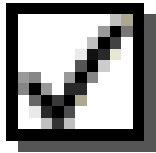
Migration

As exhaustion, however it can be defined as moving of dye from dark dyed part of fabric to lighter part for leveling/uniform dyeing all over the fabric.



Diffusion

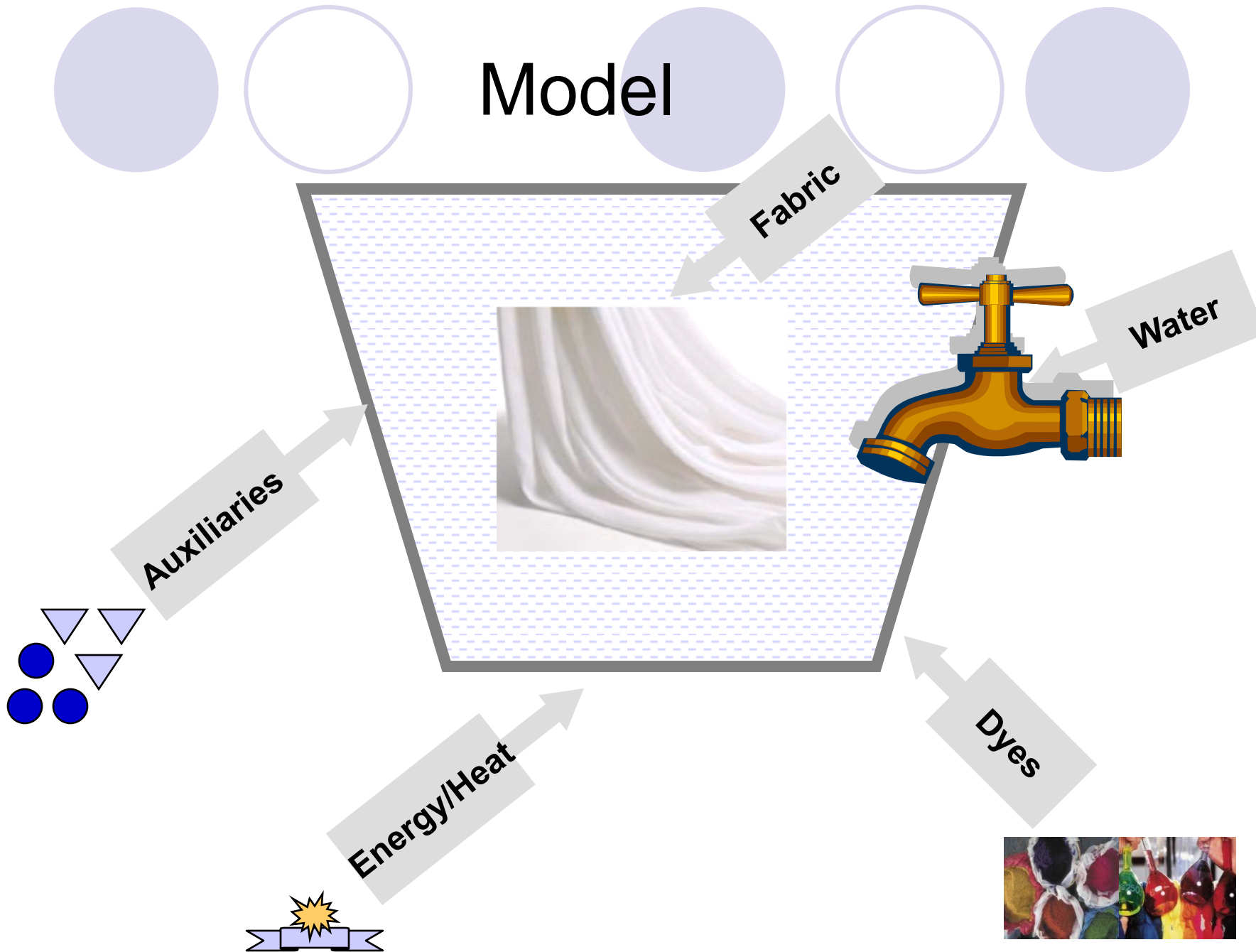
Penetration of dye inside the fabric structure.

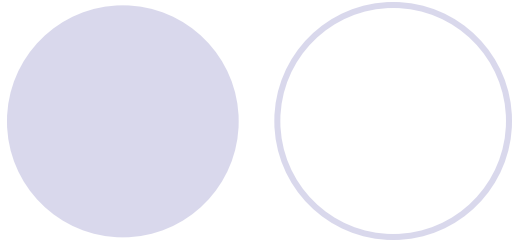


Fixation

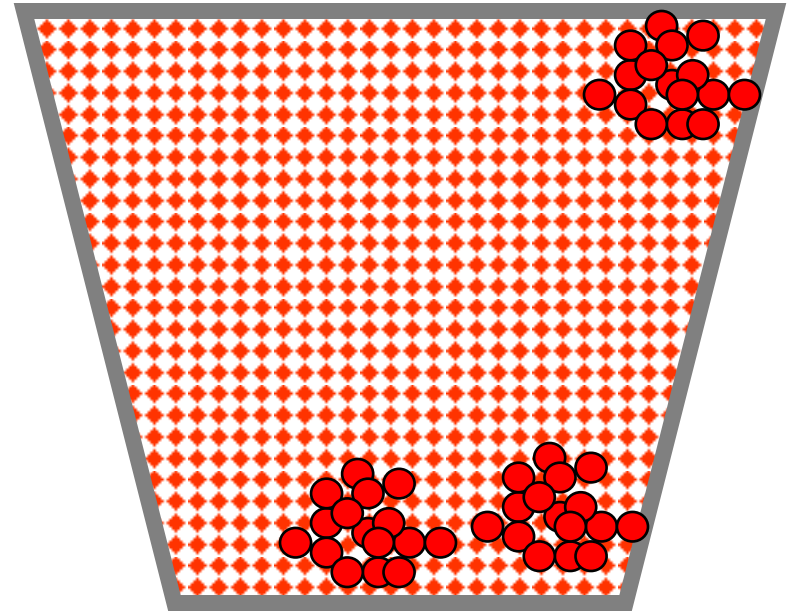
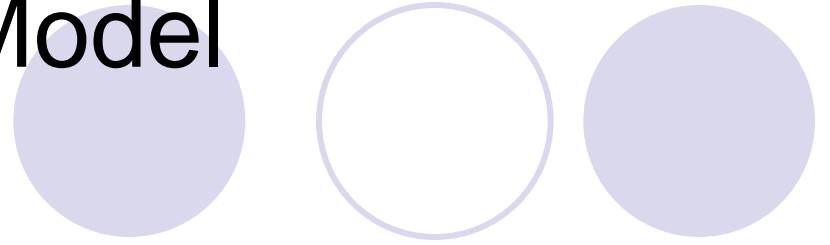
Formation of bond between the dye and fibre.

Model

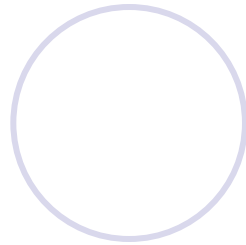
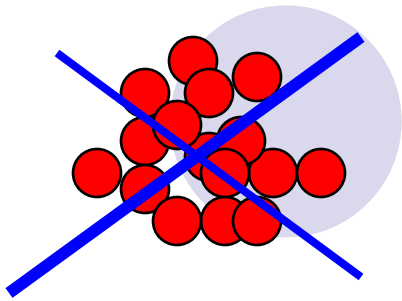




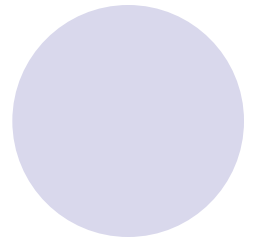
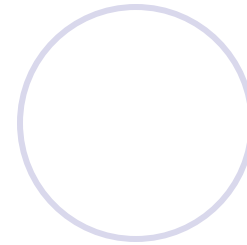
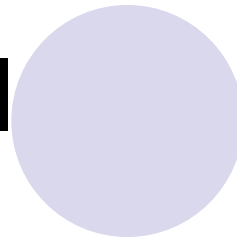
Model



Mixing / Dissolving



Model



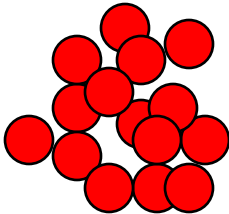
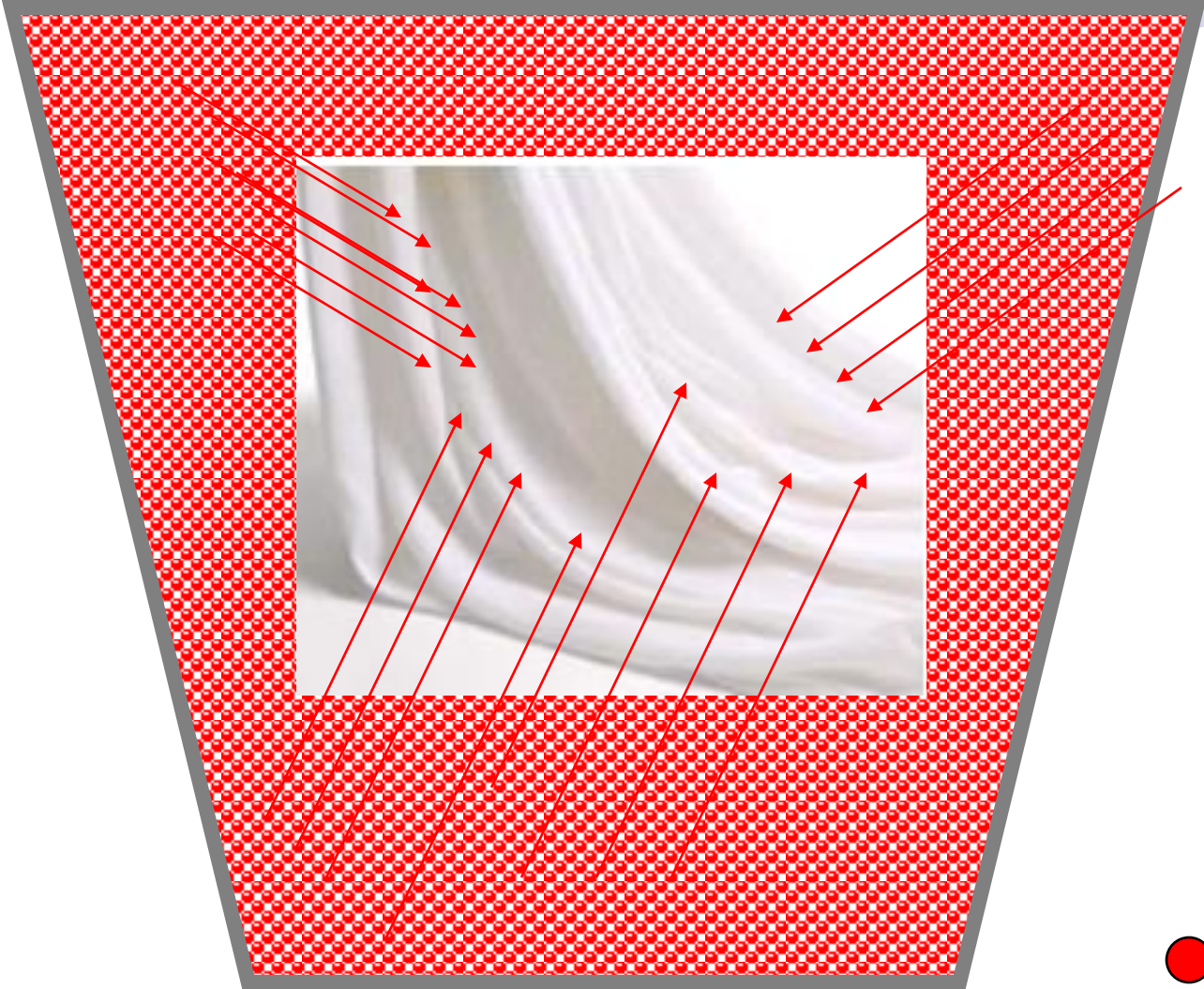
Mixing / Dissolving is achieved by:

- ***Dispersing agents***
- ***Wetting Agents***

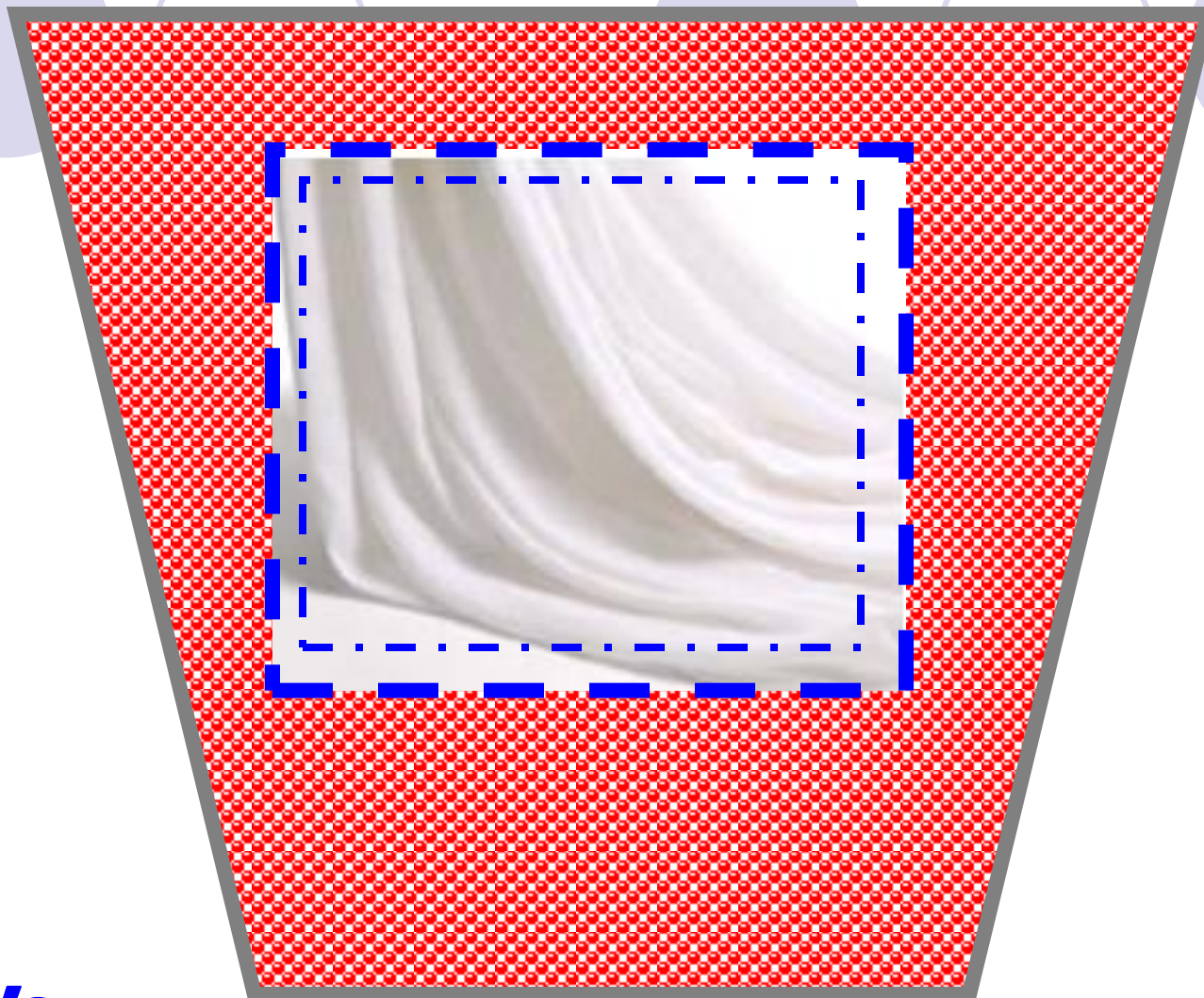
Other than temperature

- **Agitation /Stirring**

Why Dyes will move?

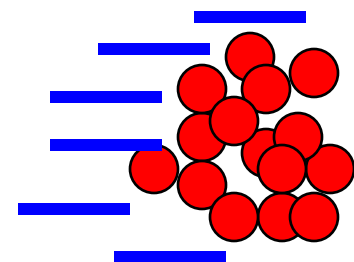


Model

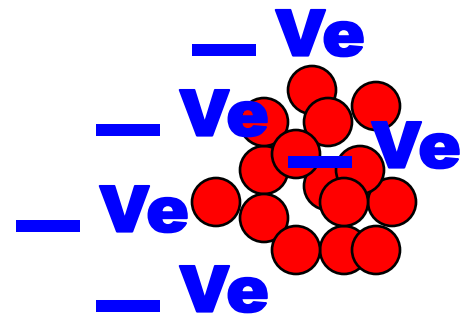
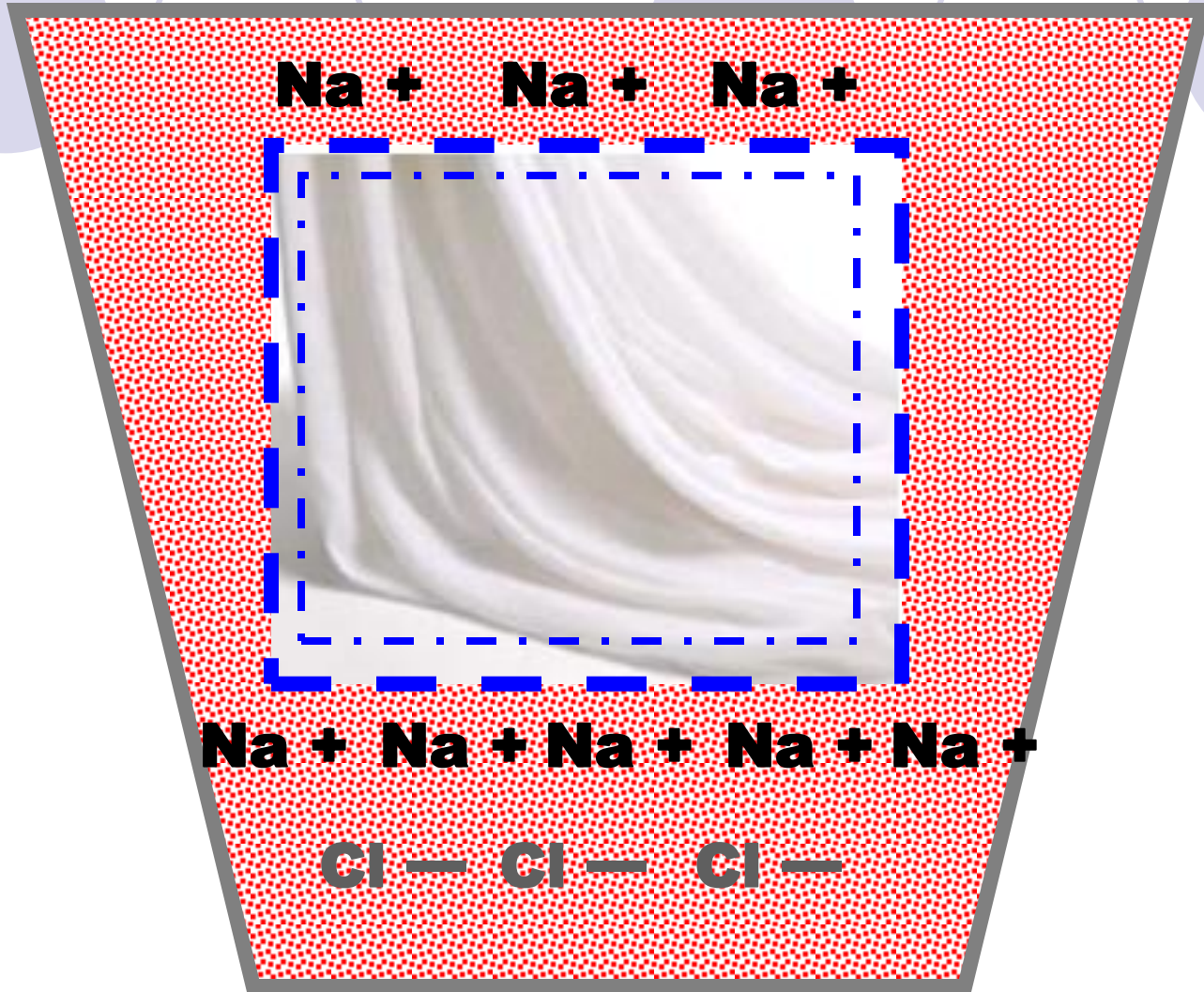


— **Ve**

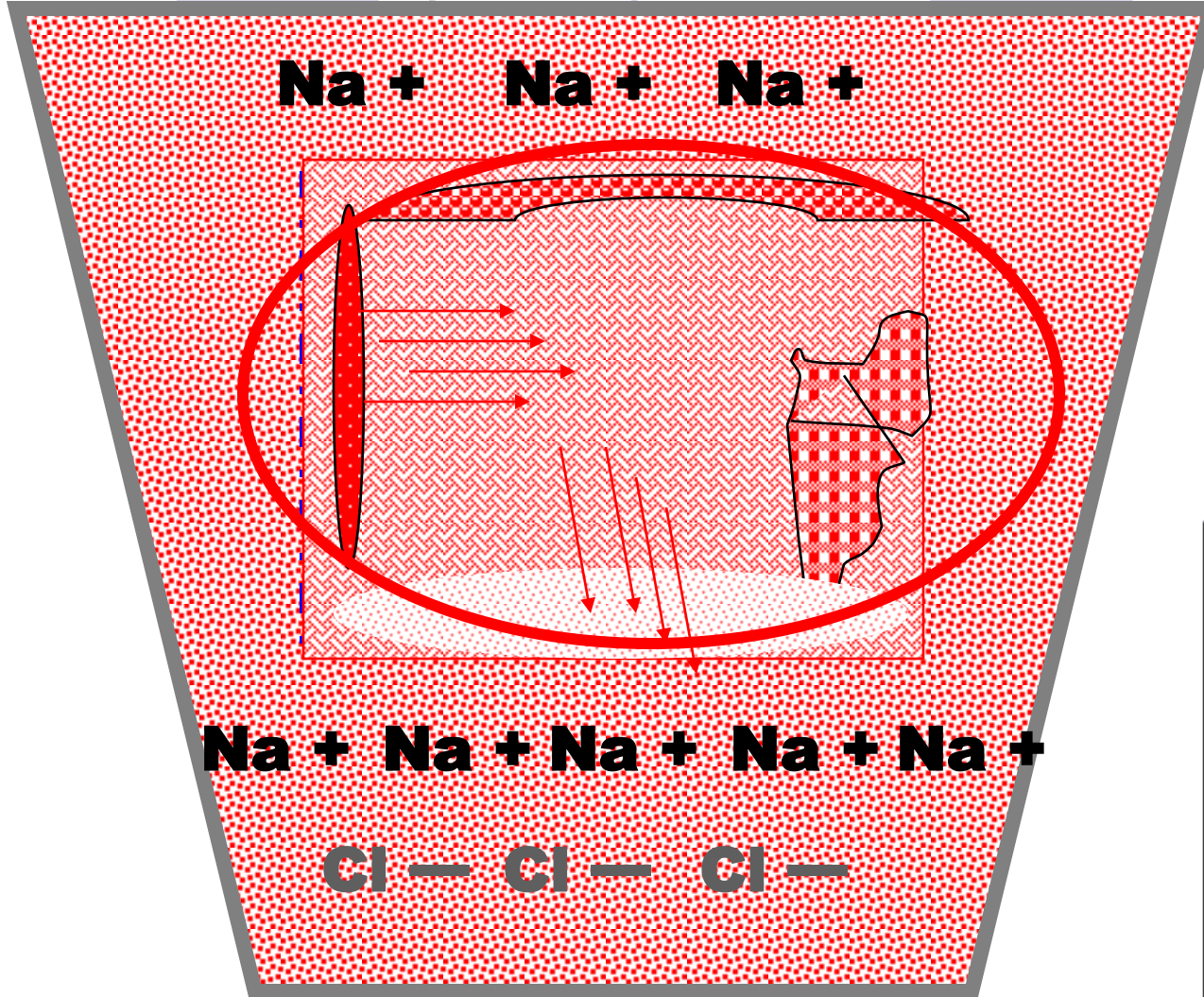
Salt: Na Cl



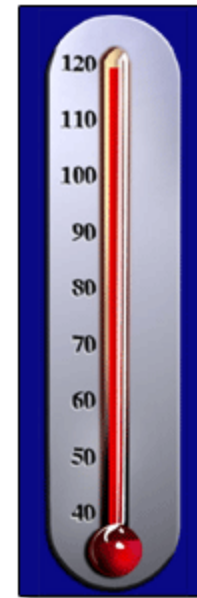
Model



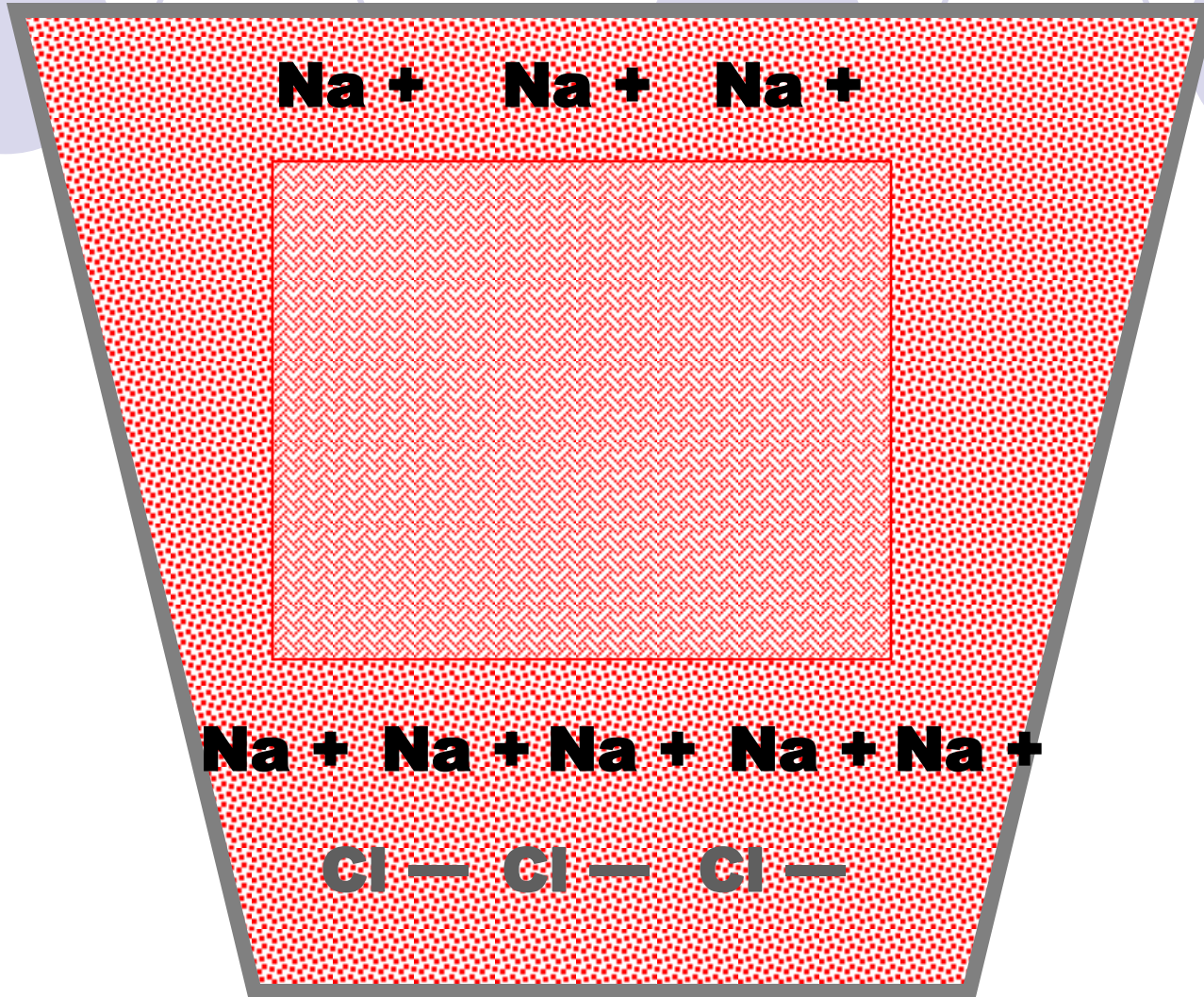
Model



Migration

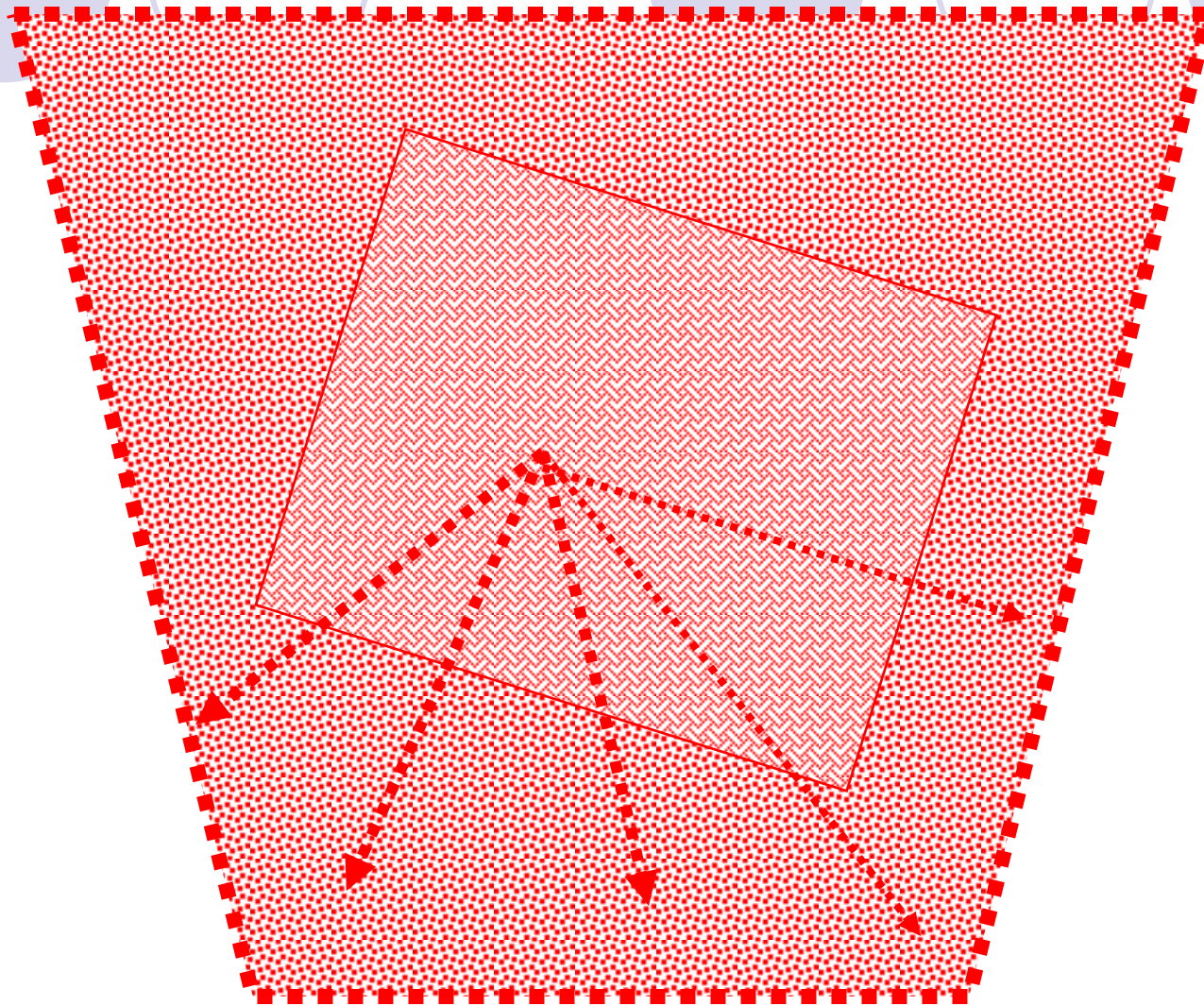


Model



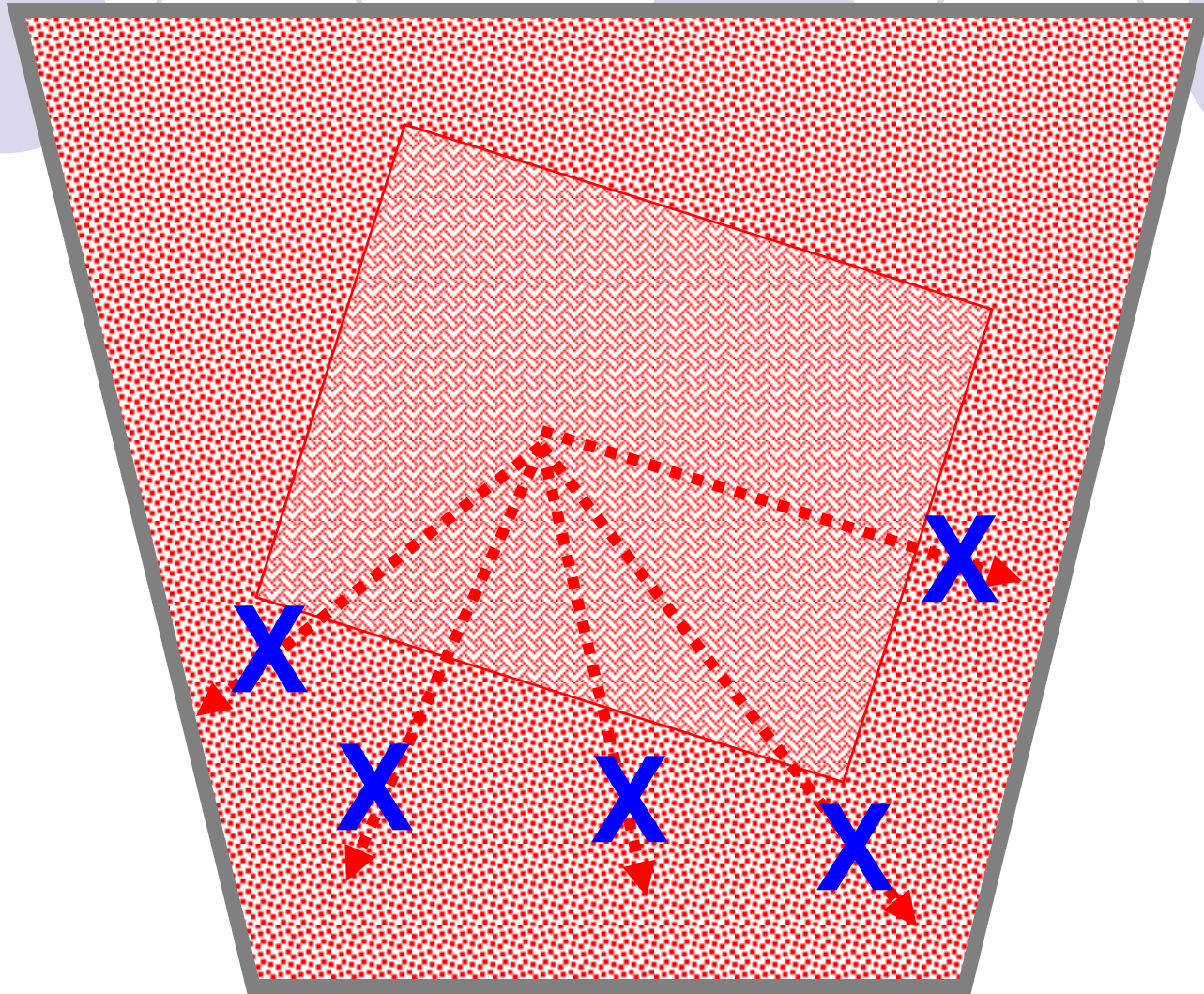
Exhaustion

Then what will happened during Home
Laundering if dye not yet fix



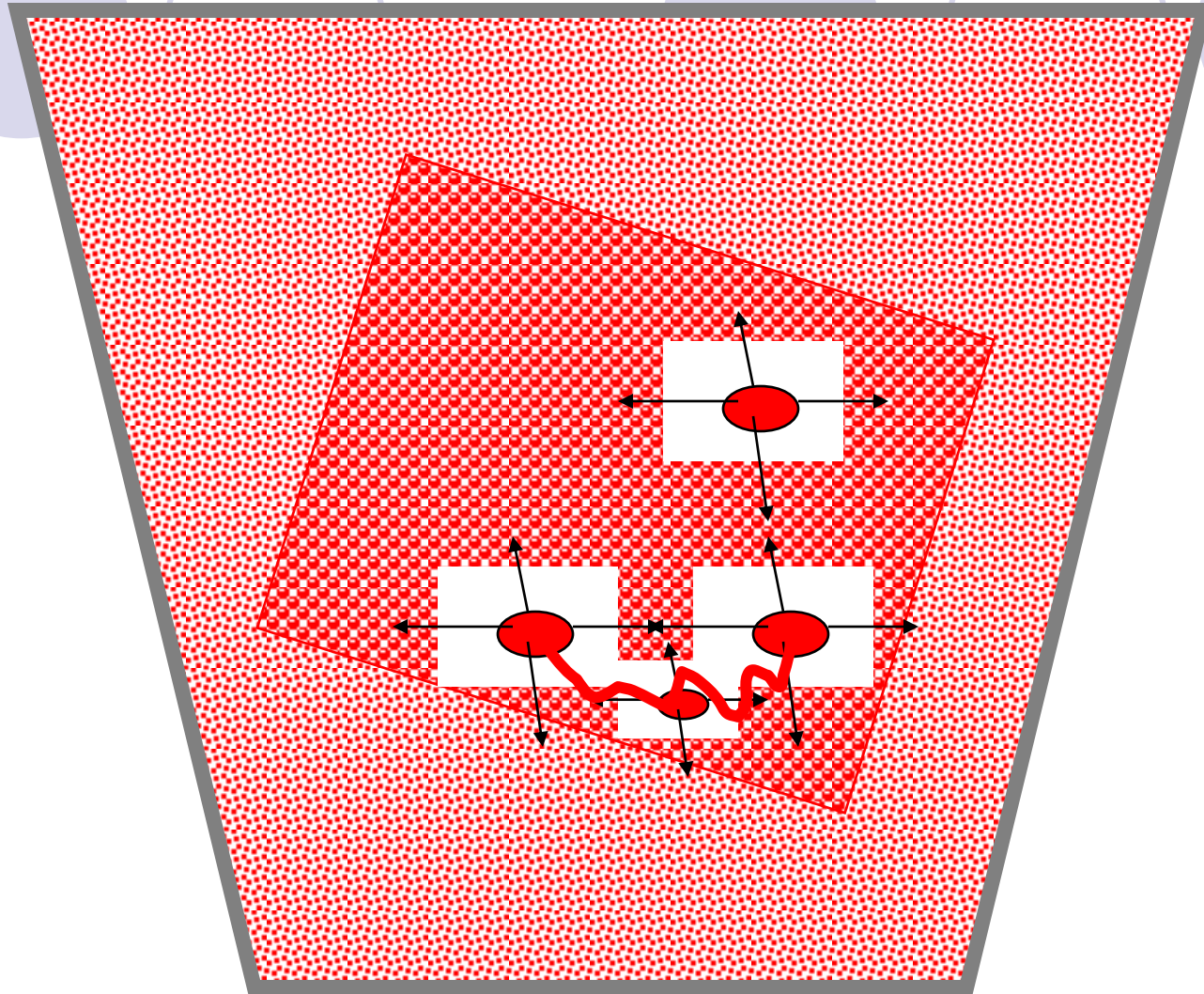
Back to water...

Model



It need to trap the dye particles inside the fibres structure...

Model



Fixation



Fixers

Why Washing???

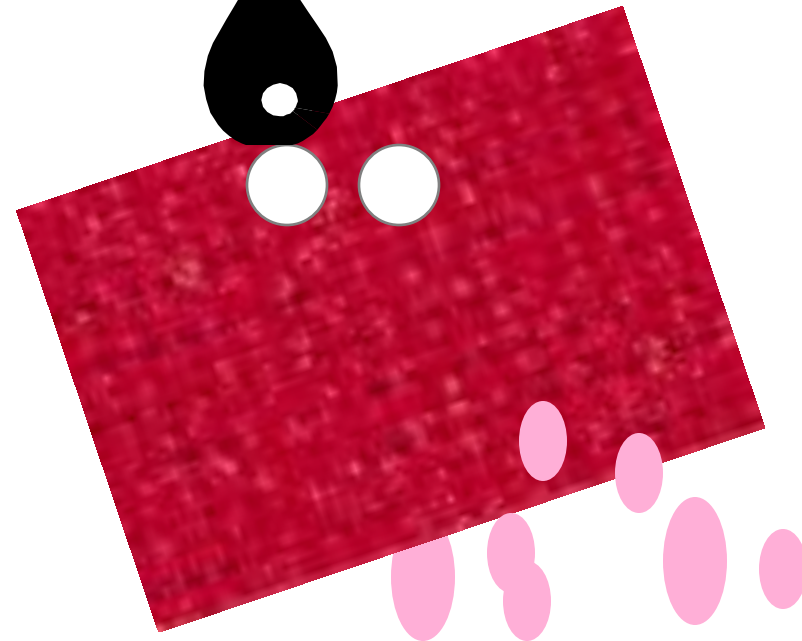
To remove

- Unfixed Dyes
- Salt Removal
- Alkali Removal
- Neutralization

Sequence of washes...?

1st with hot water

2nd with soft/cold water



Exhaust Dyeing

At A set bath at 30°C with required amount of dyestuff.

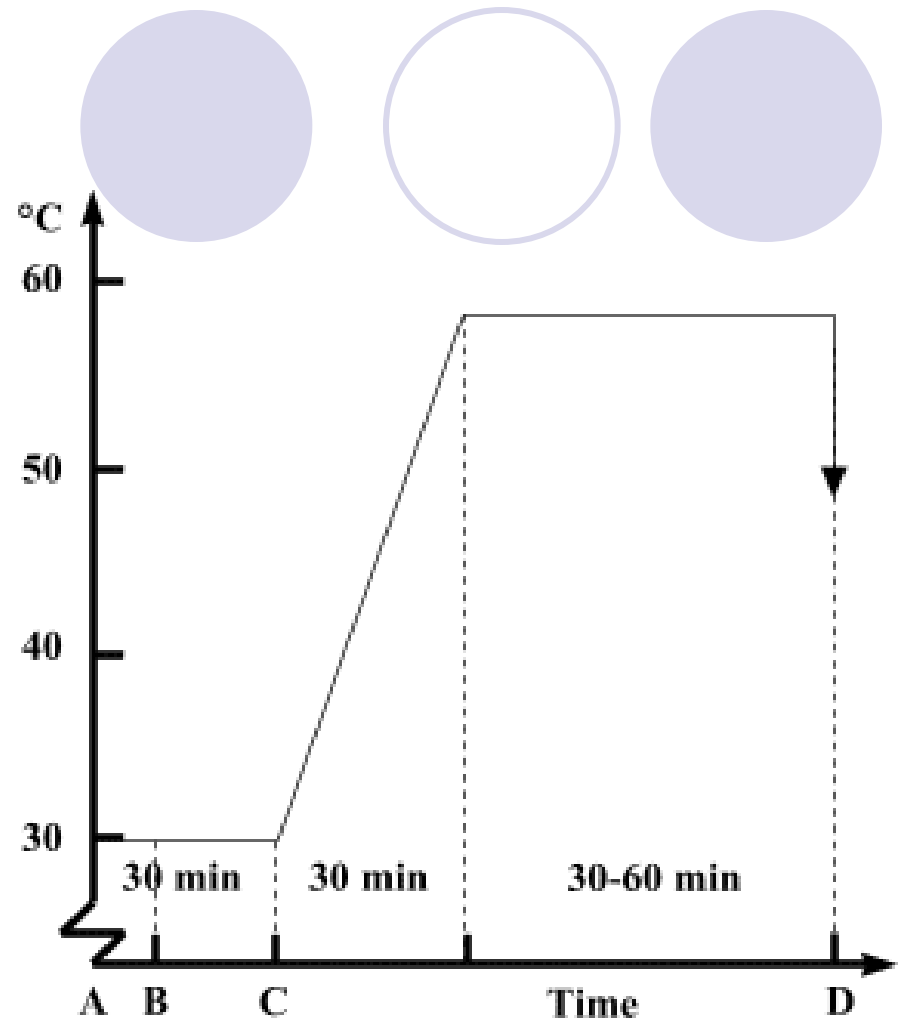
Circulate goods to ensure even distribution.

At B add common salt 20-80g/l and run 10-15 minutes.

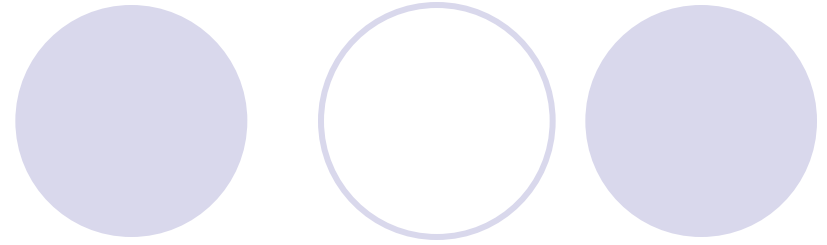
At C add 10-30g/l alkali and raise temperature to 60°C in 3 minutes. Run at 60°C for 30-60 minutes.

At D drop liquor, rinse hot, cold and soap off.

However, for dark shade temp. should be between 60-80°C for 30-60 minutes



Dyeing Methods



- Batch method
- Semi-Continuous method
- Continuous method

Dyeing Machines for Batch Method

- **Fiber Dyeing**

1. **Loose stock dyeing machine**

- **Yarn dyeing**

1. **Cone dyeing machine**
2. **Hank dyeing machine**

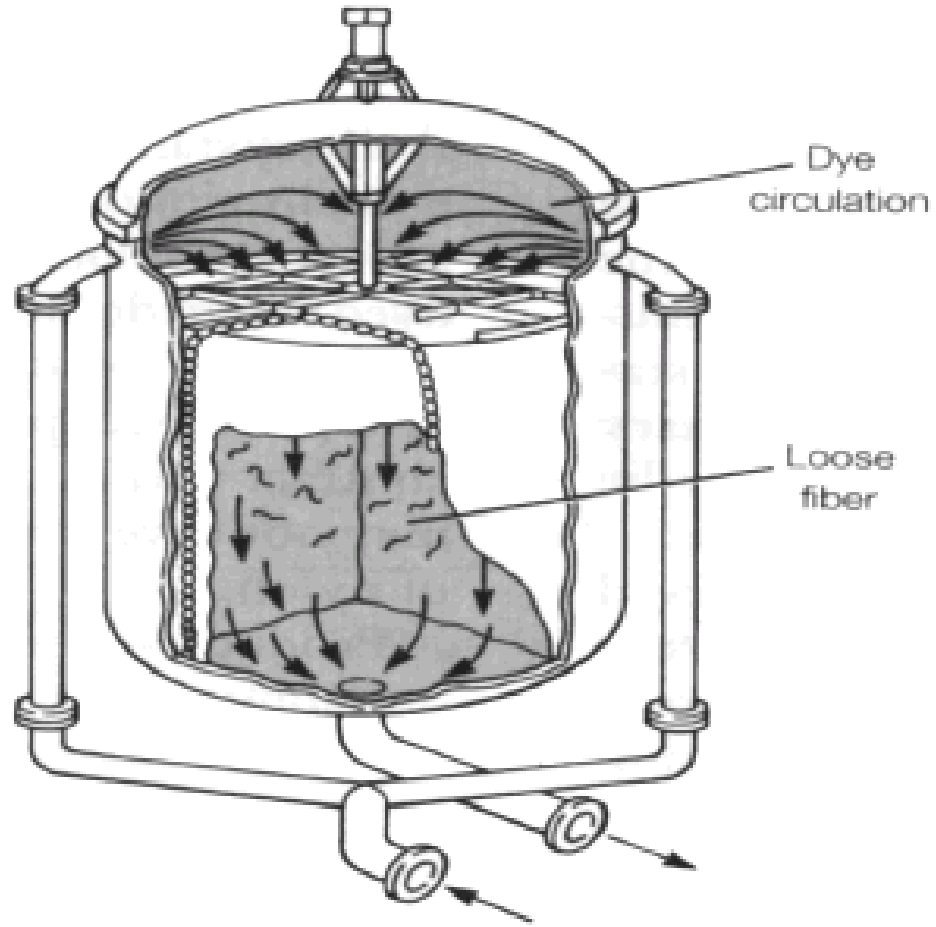
- **Fabric dyeing**

1. **Winch dyeing machine**
2. **Jigger dyeing machine**
3. **Jet dyeing machine**
4. **Soft flow dyeing machine**
5. **Beam dyeing machine**

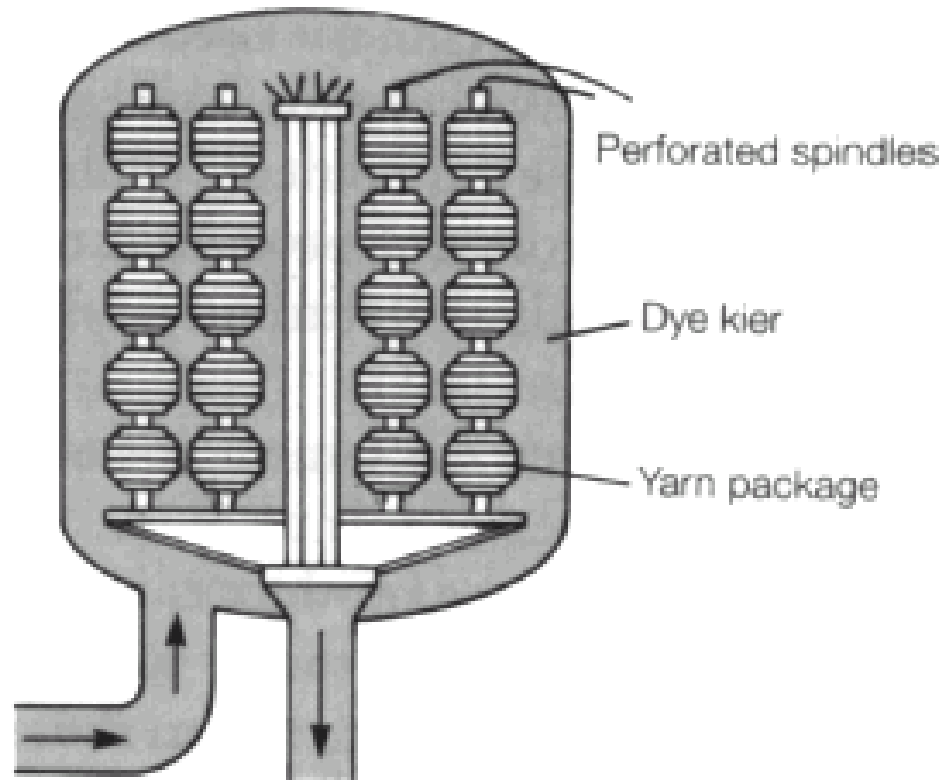
- **Garment Dyeing**

1. **Peg Dyeing machine**
2. **Rotary Drum dyeing machine**

Stock Dyeing



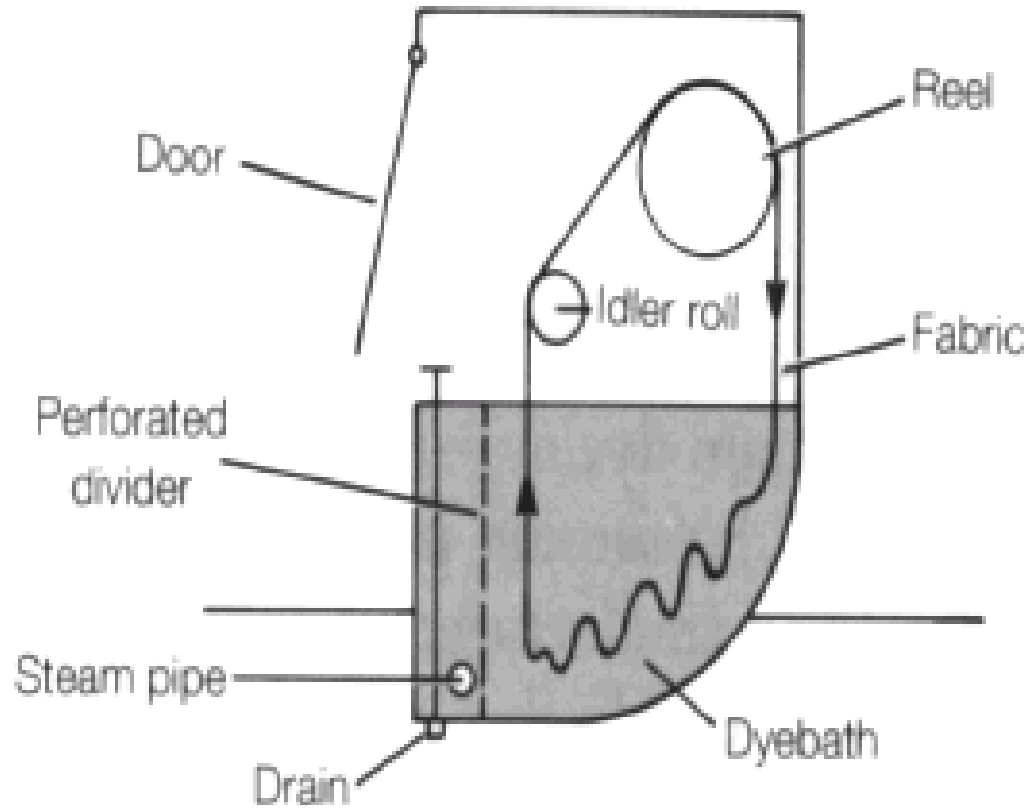
Yarn Dyeing



Yarn dyeing

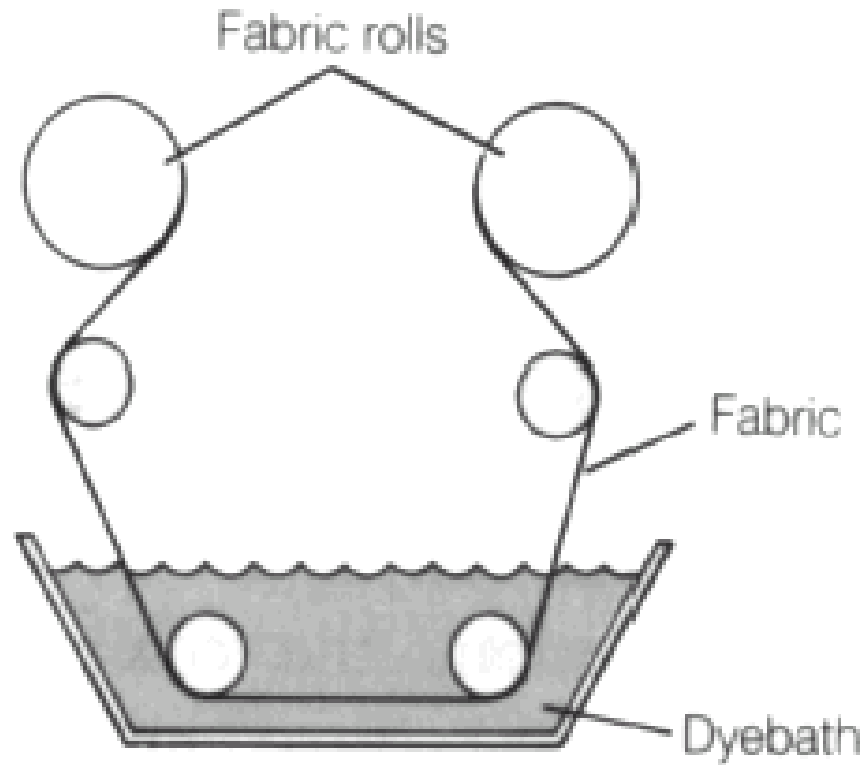


Fabric Dyeing-Winch



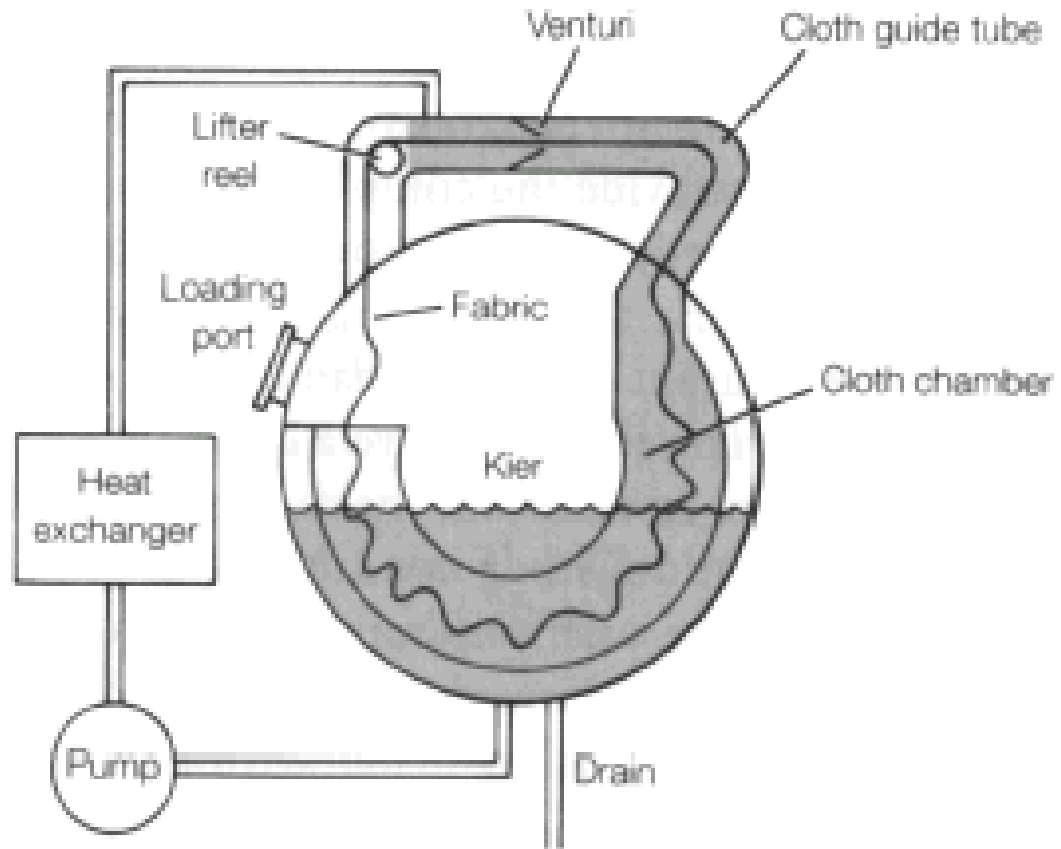
Piece dyeing-Winch

Fabric Dyeing-Jig



Piece dyeing Jig

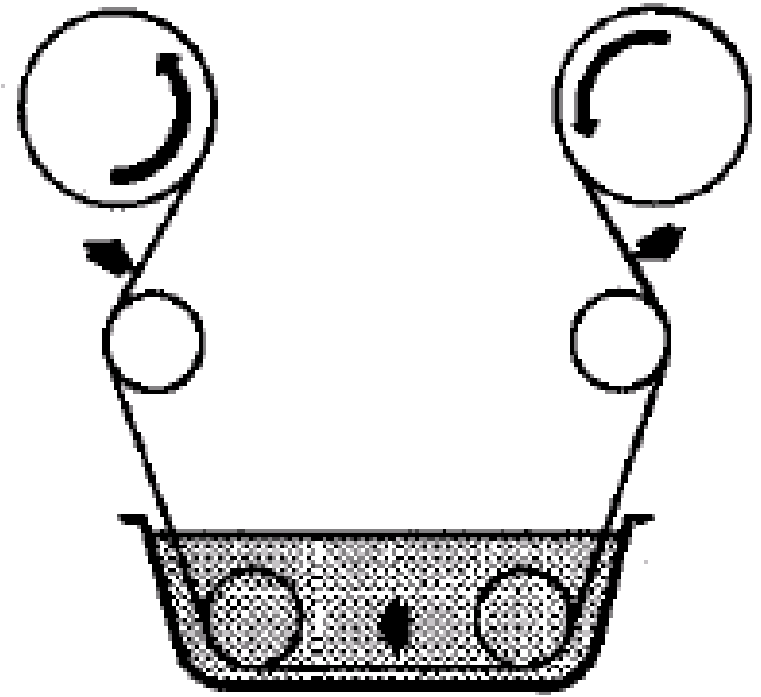
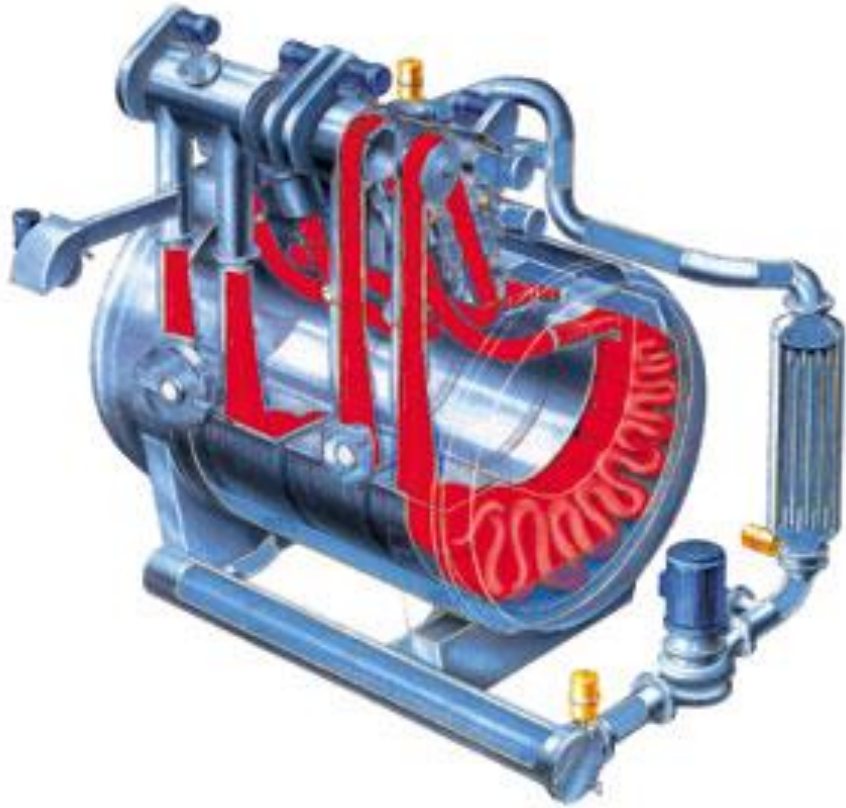
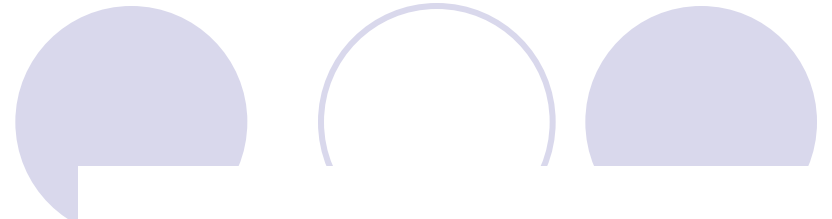
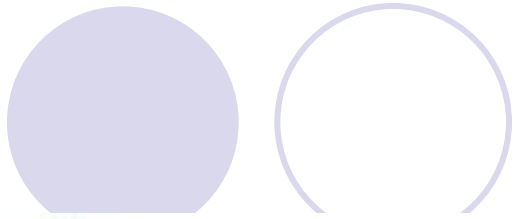
Fabric Dyeing-Jet



Piece dyeing-Jet



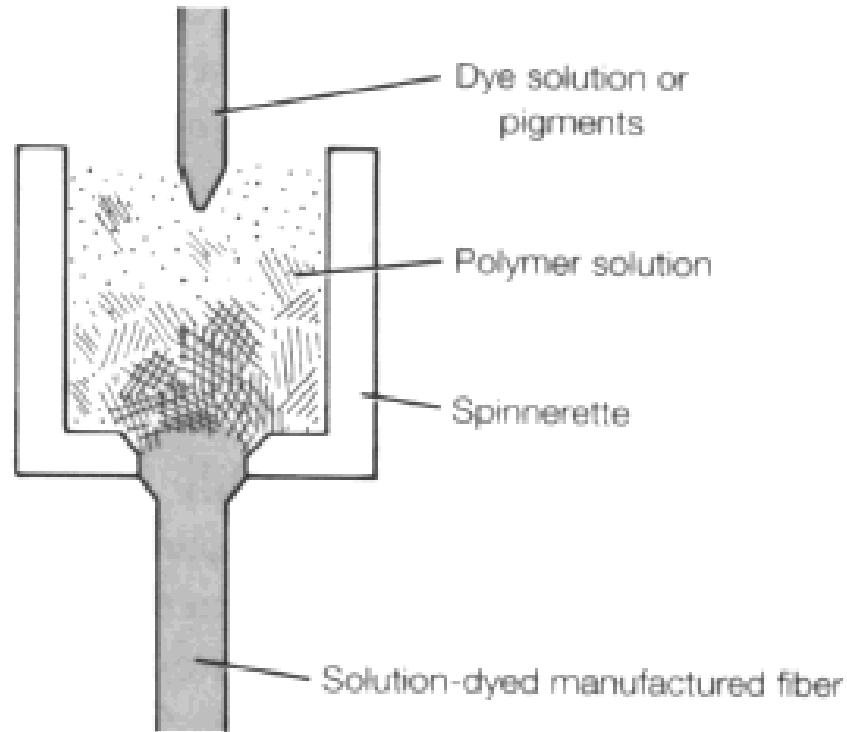




Jlg

Dyeing Machines

Producer Dyeing / Solution Dyed



Producer dyeing