

Techniques for recovery of process chemicals and auxiliaries

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Outline

- Recovery of sizing agents
- Recover and re-use alkali from mercerising
- Re-use/recycling of dye baths
- Recycling of printing pastes



Recovery of sizing agents by ultrafiltration

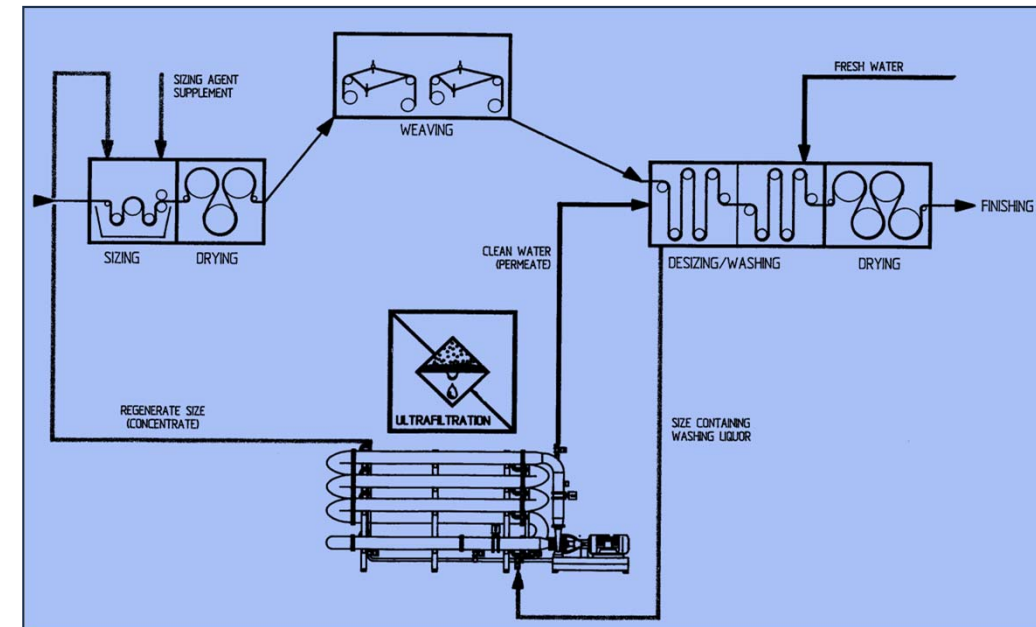
- Sizing agents are the main source of COD in waste water (40 – 70 % of the total COD load of woven fabric finishing mills)
- Water-soluble synthetic sizing agents can be recovered by ultrafiltration:
 - polyvinyl alcohol,
 - carboxymethyl cellulose,
 - polyacrylates
 - some modified kind of starch as e.g. carboxylmethyl starch
- Recycling of sizing agents is only technically and economically reasonable for integrated finishers with weaving and finishing near by

Benefits:

- Recovery rates for sizing agents 80-85 %
- COD load is reduced by 40 – 70 %
- Significant reduction of energy consumption for waste water treatment
- Reduction of quantity of sludge from waste water treatment

Recovery of sizing agents by ultrafiltration

- Sizing agents concentration in the washing liquor is about 20 - 30 g/l
- In the ultrafiltration plant, they are concentrated to 150 - 350 g/l
- After ultrafiltration the concentrate can be re-used for sizing
- The permeate can be recycled and re-used as water in the washing machine
- The concentrate is kept at high temperature (80 - 85°C) and does not need to be reheated resulting in less energy consumption
- A pre-filtration step is carried out to remove fibres and fine particles
- Cleaning is carried out 1x/week automatically with addition of surfactants and citric acid.



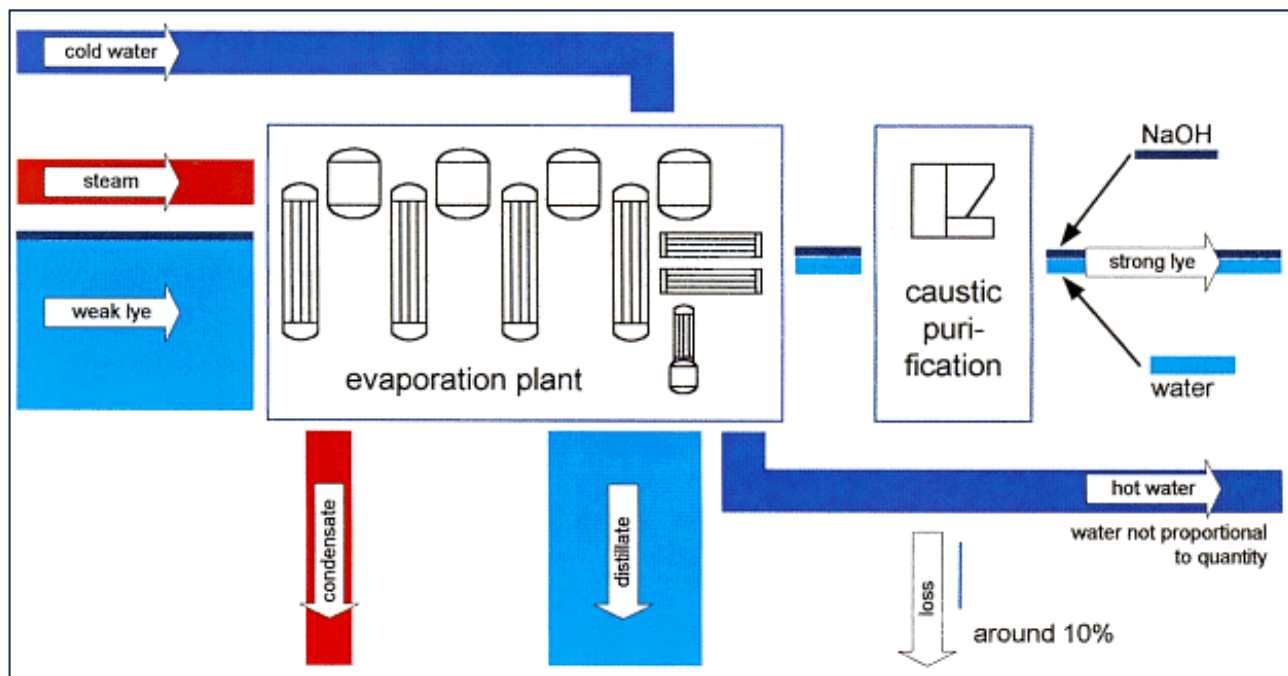
Recovery and re-use of alkali from mercerising

- **Mercerising:** main source of alkaline load of waste water
- Rinsing water from mercerising (weak lye: 40 - 50 g NaOH/l) is concentrated by evaporation for re-use in mercerisation.

Benefits

- Saving of resources (no add-on of new products)
- Recycling degree up to 80%
- Less energy consumption compared to white liquor production
- Alkaline load of waste water is reduced drastically
- Energy savings in water heating due to heat exchange from concentrated lye results to e.g. water for dyeing processes. (Water for dyeing is heated from approx. 18°C to 60-70°C.)
- Pay-off time less than 1 year

Recovery and re-use of alkali from mercerising



Scheme of the caustic soda recovery process

BREF Textile Industry Chapter 4.5.7

- Before evaporation fluff, fibres, and other solid particles are removed by self-cleaning curved screens and micro-filtration.
- More pollution is reduced by the installation of a sedimentation tank.
- Weak lye is concentrated in 2 - 4 steps in the downstream evaporation plant.
- Oxidation with hydrogen peroxide destroys the unwanted yellow colour of the strong lye.
- Subsequent cleaning is done by flotation.
- The recycled lye has to be cooled before re-use. Subsequently, the required fresh-water can be used for hot processes.

Re-use/recycling of dye baths

- exhausted hot dye baths are analysed for residual colourant and auxiliary concentration, replenished and re-used to dye further batches
- holding tanks for the spent baths are needed
- modern batch dyeing machines have built-in holding tanks for uninterrupted automatic separation of concentrates from rinsing water
- easiest systems for re-use are dye classes with high affinity (exhaustion) and minimum changes during the dyeing process (e.g. acid dyes for nylon and wool, basic dyes for acrylic, direct dyes for cotton and disperse dyes for synthetic fibres)
- on average four cycles of the same shade are possible
- **Reduction of overall water consumption of 33 %**
- **Cost savings (depending on water price and effluent disposal costs)**

Recycling of printing pastes

- Printing pastes are highly concentrated preparations that consist of dyestuff, thickener and various other auxiliaries
- Printing paste residues can reach levels as high as 40 – 60 %
- In most companies printing pastes are prepared with computerised systems. At the end of a run each residual paste is weighed and sent to a defined location in a storage facility. The composition is saved electronically and computer programmes calculate the formulation of new printing pastes.
- Another option is to empty all drums with residual printing paste and sort it according to its chemical characteristics (that is, type of dyestuff and thickener)

Benefits:

- Recovery rates up to 90 % are possible
- cost reductions for residual printing paste disposal

Thank you for your attention!



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