PRE-TREATMENT OF DIFFERENT FIBERS – PART VI

REF: TT/ DECEMBER 2020/ WK 5

C) Pre-treatment of Linen (Flax fiber)

Like cotton, major component of linen is cellulose. Other than this it also contains hemicellulose and lignin. Pectins, fats and waxes are present as impurities in the fiber. The scouring process removes natural oils, waxes and pectins from the fibre so that the dyes can penetrate the fibre easily and produce uniform dyeing. The presence of dark colored lignin requires to decolorize, hence bleaching is done. The pre-treatment is carried out depending on the requirement of whiteness for full white or for bright light or pastel shades, semi bleach or partial bleach by scour-bleach process.

Chemical composition of flax fiber

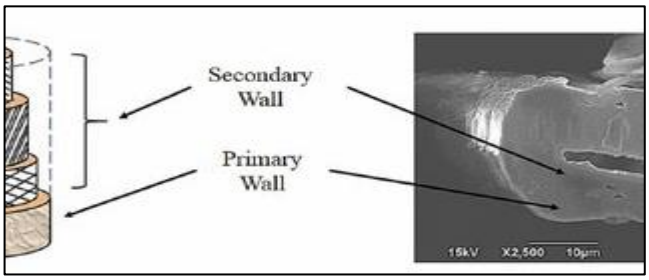
CELLULOSE – 92%
HEMI CELLULOSE – 2%
LIGNIN – 4%
PECTINS, FATS, WAX, MINERAL COMPOUNDS ETC – 2%

Ref: textileadvisor.com

Flax fibres which are mainly composed of cellulose are surrounded by a hydrophobic layer that restricts the fibre from wetting. This hydrophobic layer constituted from natural impurities i.e. pectin, hemicellulose, lignin, proteins, waxes, fats and mineral compounds. These impurities are required to be removed during pre-treatment, so that to impart hydrophilic property to the fibre.

Lignin, being a constituent of this non-cellulosic matter - is a large, cross-linked macromolecule. It is also hydrophobic in nature. Lignin can be dissolved by transforming into derivatives by chlorination and oxidation and then by leaching. Lignin is not desired in fibres and needs to be removed.

These impurities are effectively removed by chemical scouring in sodium hydroxide solution.



Lignin

- **Lignin is present in the primary wall and secondary wall of the flax fibre.**
- **It is sparingly soluble in water.**
- **Lignin is resistant to mineral acid.**

Fig 1.1 Structure of a flax fibre cell

Ref: researchgate.net

To keep the environment aspects in mind, other methods have been also developed. The application of enzymatic pre-treatment of fabrics is one of those, which is used as substitute to the traditional alkali scouring. In particular, pectinolytic enzymes are effective in removing non-cellulosic substances from linen fabrics. Enzyme such as laccase is active during the decomposing of the lignin-cellulose complex. Laccase occurs in certain plants and bacteria, but the enzyme is abundant in white-rot fungi and it is assumed to comprise a lignin biodegradable complex. Laccase is one of the most important enzymes. In lignin degradation it can attack polymeric lignin and degrade the framework structure loosely, introduce additional hydrophilic groups, and produce water soluble material.

Besides scouring and bleaching, demineralisation is also carried out to get rid of heavy metal ion contamination from the fibre and to help achieve improved whiteness and minimum yarn strength damage.

References:

1. www.fibre2fashion.com
2. www.fibtex.lodz.pl
3. nopr.niscair.res.in

.....To be continued.....

UNSCRAMBLE THE JUMBLE WORDS
TINPEC
NINLIG
CCASELA
ERALISATIONDEMIN

Last week`s Answers: 1) VEGETABLE 2) CARDING 3) OXIDATIVE 4) PHOSPHATE

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