

## COLOUR PROPERTIES OF DYED RAW LINEN FABRIC PRETREATED WITH ENZYMES

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Linens textiles appear to be some of the oldest in the world: their history goes back many thousands of years and dyed flax fibers found in a prehistoric cave in Georgia suggest the use of woven linen fabrics earlier to 36,000 BC. Nowadays flax fibers return in the fashion industry thanks to freshness, comfort and elegance of linen clothing. Flax industry is very important for the development of Latvian economy, due to broad range of application of flax fibres and seeds.

Textile processing industry is one of the major environmental polluters. There are several new technologies using enzymes, able to modify fiber parameters, achieve desired properties and improve processing results and ecology in the area of bast fibre processing and fabric finishing [1]. Only few researches are devoted to the influence of enzymes treatment on dyeing processes. Direct dyes are popular for cellulosic fibers dyeing due to easy use. Lack of these dyes is only moderate colour fastness characteristics [2].

The aim of our investigation is assessment of enzymes treatment influence on raw linen fabric dyed with the triad of direct Solphenyl dyes (Yellow GLE, Blue FGLE and Scarlet BNLE 200 %) colour and colour fastness properties.

For experiments raw linen fabric in plain woven technique with fabric surface density of 162.8 g/m<sup>2</sup> modified with cellulose and pectinase (1% and 2%) solutions in water was used. The dyeing of pre-treated samples was performed by exhaustion procedure according to the recommendation of dye producer (bath ratio 50).

The enzymes pre-treated and supplementary dyed samples before and after washing (5 and 10 times in standard solution of olein soap and sodium carbonate) were tested with Easy Colour QA device, to determine L\*, a\* and b\* values in CIELab - 76 colour space. Calculated lightness difference ( $\Delta L^*$ ), common colour differences ( $\Delta E$ ), colour saturation (C) and hue (H) show the influence of pectinase and cellulase enzymes treatment on effectiveness of colour.

The influence of enzymes is different and depends on used dye. For example, lightness of red fabric modified with 1% pectinase enzyme after 5 washing cycles is invariable in comparison with untreated sample when reduce is 26%. After 10 washing cycles major decrease of lightness (36-40%) is observed for yellow fabric modified with both enzymes (2% solution).

The colour fastness to rubbing of dyed samples was tested under wet and dry conditions with testing device AATCC Crocmeter M238AA. The dry colour fastness to rubbing is higher than wet. It varies from excellent 5/5 for fabric dyed with Blue FGLE, modified with 1% cellulase enzyme to 3/4 for fabric dyed with Scarlet BNLE 200 % and Yellow GLE dye modified with both enzymes.

### References

1. J. Marek, V. Antonov, M. Bjelkova, P. Smirous., H. Fischer, S. Janosik, Abstr. of Int. Conf. on Flax and Other Bast Plants, 159-169 (2008).
2. D. Fakin, A. Ojstr ek Color. Techn. **124**, 216-222 (2008).