

TEXTILE PRINTING AND WASH FASTNESS OF INHERENT FLAME RETARDANT FABRICS FOR DUAL USE

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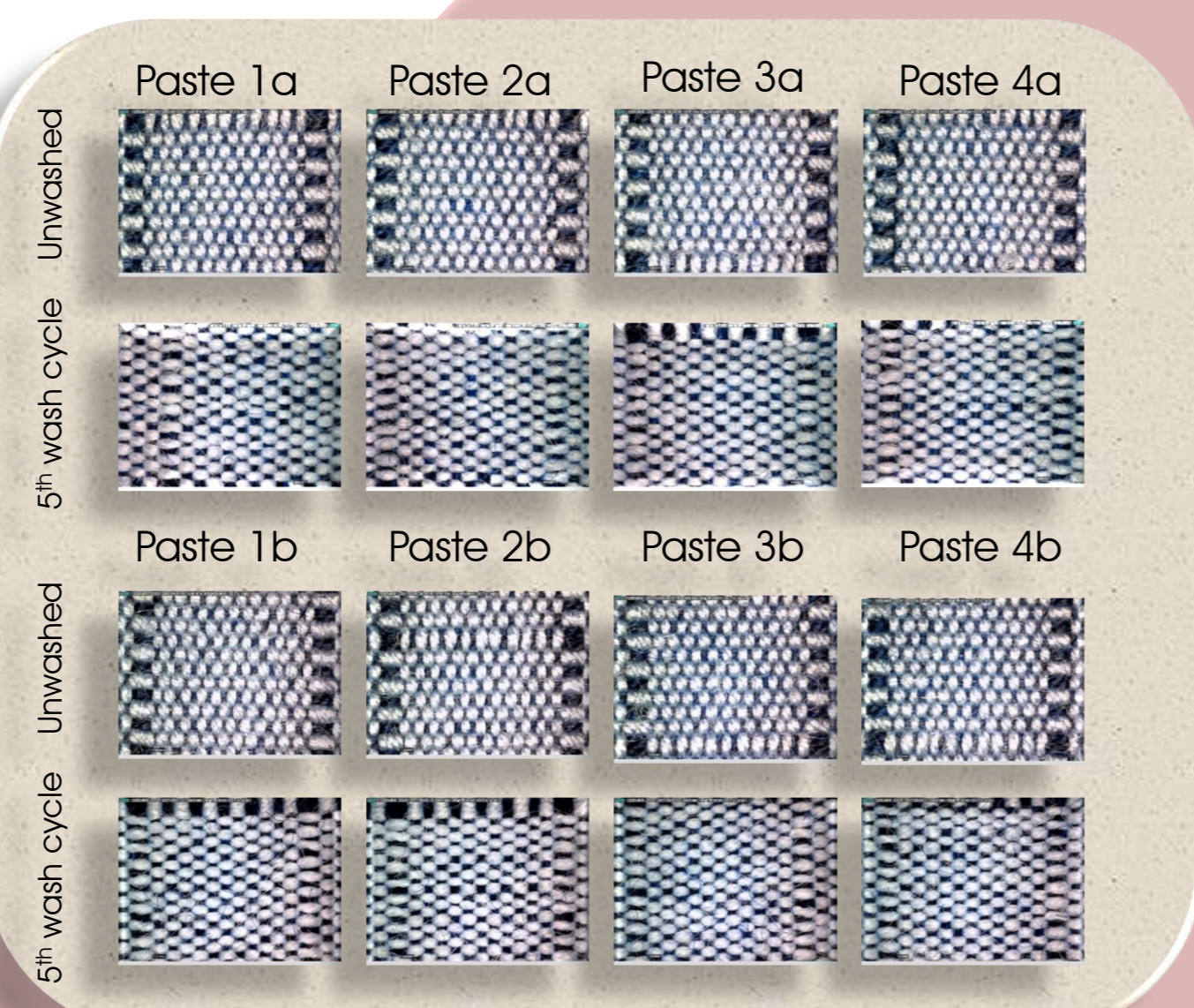
Introduction

Regarding printing on inherently non-combustible fabrics, a review of the literature revealed a significant research gap and a relatively small number of publications. In this paper, the printability of non-combustible blended fabrics with reactive dyes fabrics were analysed through evaluation of their spectral and FR characteristics before and after washing process. The tests were performed on non-commercial, inherent FR fabrics of the targeted composition. It should also be emphasized that the tests were performed on fabrics developed at the University of Zagreb, Faculty of Textile Technology as part of the project activities. Research was

performed on five fabrics varied in composition and weave. Two fabrics were in twill 2/2, two in twill 3/1 and one in rips. The warp thread of these fabrics are the same, blend of meta-aramid (95%) and para-aramid (5%), while the weft threads are different in composition. The flame resistance of the fabrics was tested by LOI - Limited Oxygen Index. Printing with reactive dyes was performed by hand screen procedure with two printing pastes varied in selection and viscosity of thickeners and in two dyestuff concentrations. After drying and fixing of the prints, wash fastness was tested. The results of LOI indicate on high resistance to burning, so all samples meet the criteria specified for the inherently flame

resistant fabrics that LOI > 26%. Comparison of LOI values does not show significant differences within variations in weft and weave. The values of pH measurement indicated acidity of the surface, which may be caused by yarn preparations, so samples were before printing washed in a mild detergent composed from anionic and non-ionic surfactants. Microscopic images of printed fabrics show that the binding of dyes in the process of printing and fixing, occurs exclusively on the viscose components of the yarn. This is also a reason of achieving relatively low values of colour strength K/S.

Fabric 1



The ratio of lightness (L^*) and chroma (C^*) showed the accordance with the K/S values. Based on the performed analysis, it can be confirmed that it is possible to achieve a certain level of colouration in fabrics that contain a high proportion of aramid fibres, if a certain ratio of cellulose component is contained. In samples used in this part of the research, the weft yarn contained a component of viscose that has the ability to bind reactive dye, and colouration was achieved even in samples that had a certain basic colour, ie were not completely uncoloured (Fabrics 1, 2 and 4). Also, the results confirmed the optimal wash fastness in the process of five washing cycles. This research is part of the comprehensive research of the characteristics of FR fabrics and the possibility of their finishing in the processes of dyeing and printing.

Fabric 2



Composition of analysed fabrics

	Fabric 1	Fabric 2	Fabric 3	Fabric 4	Fabric 5
Weave	Rips	Twill 2/2	Twill 2/2	Twill 3/1	Twill 3/1
Warp	95% m-AR 5% p-AR	95% m-AR 5% p-AR	95% m-AR 5% p-AR	95% m-AR 5% p-AR	95% m-AR 5% p-AR
Weft	2% PA 20% PA 6.6 38% CV FR 40% m-AR	2% PA 20% PA 6.6 38% CV FR 40% m-AR	20% PA6.6 40% m-AR 40% CV FR	2% PA 20% PA 6.6 38% CV FR 40% m-AR	20% PA6.6 40% m-AR 40% CV FR

Fabric 3



Fabric 5

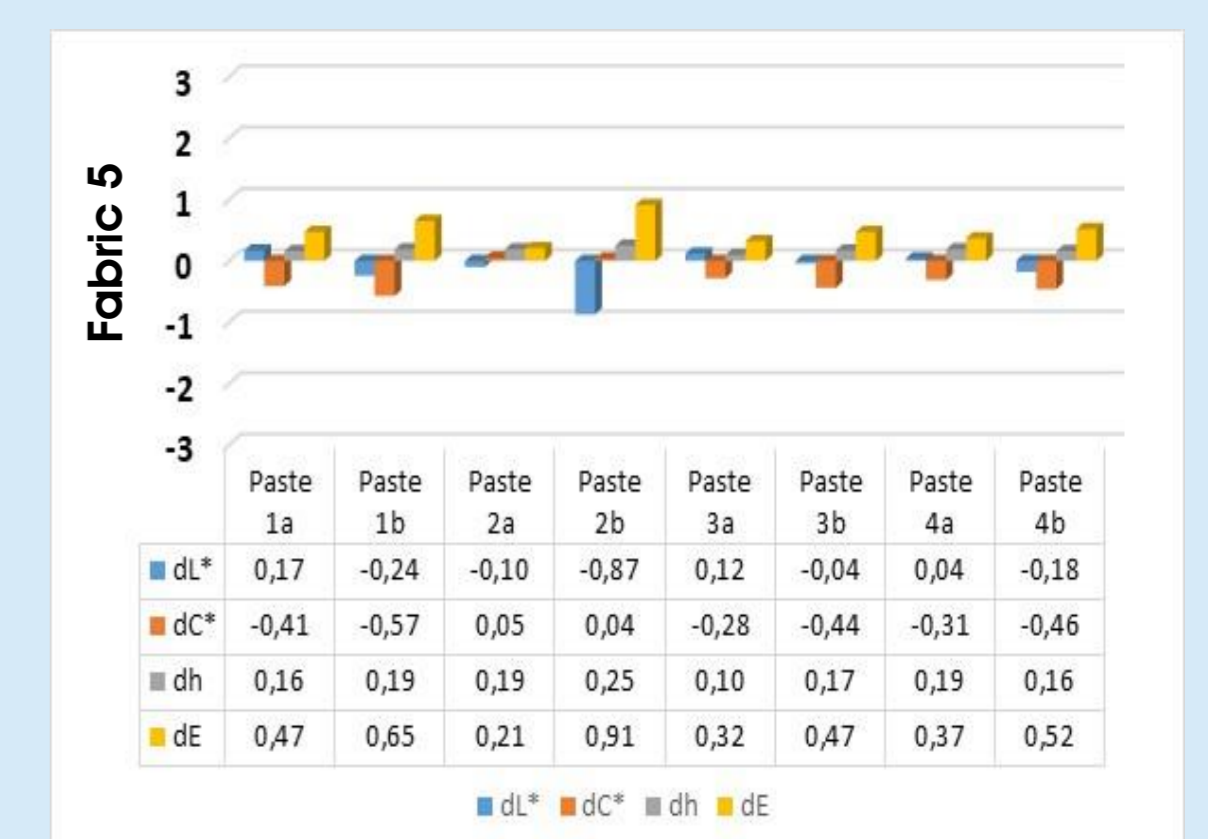


Fabric 4



Composition of printing pastes

Paste	Thickener	Dyestuff	Urea	Na ₂ CO ₃
1a	CHT-ALGINAT MV (4%)	50 g	1,26 g	20 g
2a	CHT-ALGINAT MV (9%)	50 g	1,26 g	20 g
3a	Alkagum NS (4%)	50 g	1,26 g	20 g
4a	Alkagum NS (9%)	50 g	1,26 g	20 g
1b	CHT-ALGINAT MV (4%)	50 g	7,5 g	20 g
2b	CHT-ALGINAT MV (9%)	50 g	7,5 g	20 g
3b	Alkagum NS (4%)	50 g	7,5 g	20 g
4b	Alkagum NS (9%)	50 g	7,5 g	20 g



Colour differences values calculated according to CIE76 formula, comparing values of unwashed samples with values obtained after 5th wash cycle.

Conclusion

Based on the performed analysis, it can be confirmed that it is possible to achieve a certain level of colouration in fabrics that contain a high proportion of aramid fibres, if a certain ratio of cellulose component is contained. In samples used in this part of the research, the weft yarn contained a component of viscose that has the ability to bind reactive dye, and colouration was achieved even in samples that had a certain basic colour, ie were not completely uncoloured (Fabrics 1, 2 and 4). Also, the results confirmed the optimal wash fastness in the process of five washing cycles. This research is part of the comprehensive research of the characteristics of FR fabrics and the possibility of their finishing in the processes of dyeing and printing.