Single-Bath Bio-Treatment and Dyeing of Cotton Fabrics with Reactive or Direct Dyes

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Abstract
Cotton fabrics (unscoured and scoured) were bio-treated with cellulase enzyme and dyed in one bath using reactive (MCT, VS) and direct dyes. Factors affect enzyme role such as enzyme concentration and time of treatment were studied. Effect of using non-ionic surfactant at the optimum condition of enzyme treatment using MCT and direct dyes on unscoured cotton fabrics was studied. The action of enzyme concentration on the degree of wettability of treated cotton fabrics (unscoured and scoured) dyed with MCT and direct dyes was investigated. The pilling resistance of treated unscoured and scoured cotton fabrics dyed with MCT at the optimum condition was investigated to determine the effect of enzyme on the appearance of cotton fabric, comparing the results with control sample. Colour strength, tensile strength and the fastness colour properties such as fastness to washing, crocking, perspiration and light were measured for bio-treated and dyed samples.

The results showed an enhancement in the colour strength especially with MCT and direct dyes while VS did not succeed with this process due to the hydrolysis of dye. The improvement in colour strength was found to depend on; degree of hydrolysis of cotton cellulose; characteristics of dyes used; degree of impurities in cotton fabric as well as on addition of surfactant. Using one-bath bio-treatment and dyeing technique was observed to improve the fibre wettability and the pilling resistance of cotton fabric along with slight reduction in tensile strength. Fastness properties showed results ranged from fair to very good which depended on the type of fabrics, enzyme treatment and dyes used.

Key words:
Cotton fabric; Cellulase enzyme; One bath; Reactive and direct dyes; Colour strength; Wettability; Pilling resistance.