

Single-Step Dyeing and Finishing Treatment of Cotton with 1,2,3,4-Butanetetracarboxylic Acid

HYUNG-MIN CHOI , Dept. Textile Eng. Soong Sil Univ.

A single-step dyeing and finishing (SDF) process was developed to eliminate dyeing problems associated with cotton crosslinked by polycarboxylic acid such as 1,2,3,4-butanetetracarboxylic acid (BTCA). This process consisted of several steps: (a) impregnation of the fabric by the bath containing BTCA, dye, and catalyst; (b) drying; and (c) curing at high temperature. Color strength (K/S) and dye fixation of cotton treated by the SDF process were excellent, especially with reactive dyes containing mono- or dichlorotriazinyl compounds and, in some cases, were higher than those of the sample dyed by a conventional batch process without finishing treatment. The presence of dye in the SDF process did not interfere with crosslinking of cotton. We believed that the reaction occurred between carboxyl groups of BTCA and s-triazinyl groups in reactive dyes in the presence of imidazole and other catalyst. FTIR, Raman, and X-ray fluorescence spectroscopies were used to confirm the mechanism of dye fixation. Elemental analysis also supported this mechanism. The SDF process can be an excellent way to dye fabric that also requires crosslinking treatment for smooth drying appearance.