

Sustainable Dyeing of Cotton and Polyester Blend Fabric without Reduction Clearing

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Abstract : In contemporary research world, focus is more set on sustainable products and innovative processes. The global textile industries are putting tremendous effort to achieve a balance between economic development and ecological protection concurrently. The conservation of water sources and environment have become immensely significant issue in textile dyeing production. Accordingly, an attempt has been taken in this study to develop a process to dye polyester blend cotton without reduction clearing process and any extra wash off chemical by simple modification aiming at cost reduction and sustainability. A widely used combination of 60/40 cotton/polyester (c/p) single jersey knitted fabric of 30's, 180 g/m² was considered for study. Traditionally, pretreatment is done followed by polyester part dyeing, reduction clearing and cotton part dyeing for c/p blend dyeing. But in this study, polyester part is dyed right away followed by pretreatment process and cotton part dyeing by skipping the reduction clearing process diametrically. The dyed samples of both traditional and modified samples were scrutinized by various color fastness tests, dyeing parameters and by consumption of water, steam, power, process time and total batch cost. The modified process in this study showed no necessity of reduction clearing process for polyester blend cotton dyeing. The key issue contributing to avoid the reduction clearing after polyester part dyeing has been the multifunctional effect of NaOH and H₂O₂ while pretreatment of cotton after polyester part dyeing. The results also revealed that the modified process could reduce the consumption of water, steam, power, time and cost remarkably. The bulk trial of modified process demonstrated the well exploitability to dye polyester blend cotton substrate ensuring all fastness and dyeing properties regardless of dyes category, blend ratio, color, and shade percentage thus making the process sustainable, eco-friendly and economical. Furthermore, the proposed method could be applicable to any cellulosic blend with polyester.

Keywords : cotton, dyeing, economical, polyester

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