

Issara Na Phatthalung 2014: Study of Pretreatment Processes, Reactive-Disperse Dyes Synthesis and Application for Polylactic Acid/Cotton Knitted Fabric. Master of Science (Textile Industrial Technology and Merchandising), Major Field: Textile Industrial Technology and Merchandising, Department of Textile Science. Thesis Advisor: Ms. Porntip Sea-bae, Ph.D. 106 pages.

This research aimed to investigate an appropriate pretreatment process for the knitted fabric of PLA/cotton blend. Two different pretreatment processes were studied viz. the two-step scouring with NaOH, Na₂CO₃ and pectinase enzyme followed by H₂O₂ bleaching and the 1-step pretreatment with H₂O₂. In addition, the reactive-disperse dye was synthesized by diazotization and coupling reactions between aminophenyl-4-(β-sulphatoethyl sulphone) and N,N-diethylaniline. The synthesized dye obtained was precipitated by two different techniques i.e. salt precipitation (RD-Salt) and alkali precipitation (RD-Alkali). Their dyeing behavior was examined on PLA, cotton and PLA/cotton blended fabrics (for all-in dyeing process). The results found that the optimum pretreatment process for PLA/cotton blended fabric prior to deep shade dyeing was either that employed 10%owf pectinase enzyme at 60°C for 60 minutes or pretreatment with 7%owf Na₂CO₃ at 70°C for 90 minutes. These two pretreatment conditions had the least effect on the fabric strength. In the case of that ongoing to pale-shade dyeing, the 1-step pretreatment with H₂O₂ at 100°C for 60 minutes provided satisfactory water absorption and whiteness on the PLA/cotton blended fabric. The fabric could absorb water instantaneously and the whiteness was achieved at 72.47. This process was beneficial in terms of time saving and minimal loss of fabric strength. The dyeing study showed that RD-Salt dye exhibited a superior dyeing result on PLA, cotton and the blended fabrics to RD-Alkali dye. The optimum dyeing condition of RD-Salt for PLA was at pH 6, 110°C for 30 minutes whereas it was suited to apply this dye on cotton under the condition employed 60 g/l Na₂SO₄ and 20 g/l Na₂CO₃ at 90°C for 60 minutes. Application of the RD-Salt dye on the blended fabric was suggested to firstly perform with the dye solution at pH 6, 110°C for 30 minutes (to dye PLA component), after that lowering the dyeing temperature to 90°C followed by addition of 60 g/l Na₂SO₄ stained for 30 minutes afterward added 20 g/l Na₂CO₃ for 30 minutes (to dye cotton component). The color fastness to washing of the two reactive-disperse dyes on cotton and PLA/cotton blended fabrics were moderate while an excellent wash fastness rate was observed on PLA.

Student's signature

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