

Effect of the Dyes on the Dyeing Properties of Poly Lactic-Acid Fiber

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1. Introduction

Poly(lactic acid)(PLA) is important for its relatively new use in textiles such as apparel, indoor and outdoor furnishings, and hygiene products. PLA fiber is most commonly dyed with disperse dyes. One major concern with PLA is that only a limited number of disperse dyes have been found to have good absorption on PLA at the appropriate dyeing temperature. High percentage dye absorption is important because it decreases the dye consumption requires to obtain a given shade, and the lower dye absorption results in less pollution and a lower cost of dyeing. High dye absorption indicates that the dye has a high affinity for the fiber and, therefore, good colorfastness. Because high percentage dye absorption on PLA is important.

In this study, PLA fibers to be dyed, dyes, dyeing temperature, dyeing time, with changes in PLA fiber is to establish an efficient dyeing process

2. Experimental

2.1. Materials

100% PLA (150 denier/144 filament) filament yarn was provided by huvis Co.(korea)

PLA was scoured prior to dyeing with a solution of sodium carbonate(1.5g/L) for 20min at 90°C.

The commercial dye employ in this study are 18 disperse dyes.

2.2 Dyeing procedure and dye absorption measurements

Dyeing and dye absorption measurements were performed by Dye-O-meter (Dyemax-L, Korea).

PLA yarn was dyed at a liquor-to-goods ratio of 20:1 in a dyebath containing disperse dye(1.0%o.w.f) and dispersing agent (0.5g/L). Dyebath pH was adjusted to 5.0 using acetic acid and then dyeing commenced at a dyebath temperature of 60°C, Which was ramped up to the maximum dyeing temperature at a rate of 1.5°C/min. These maximum temperatures were 110°C. After holding at the maximum temperature for 30min, the dyebath was cooled back to 50°C at a 3°C/min. PLA yarn was then removed from the dyebath and rinsed with cold water.

3. Results and Discussion

Dye absorption percentages following application to PLA of the 18 disperse dyes are given in Fig.1.

The most extreme variation was seen in the former category with the best performing dye, Lumacron RED EFB.

Lumacron RED S3BS, Lumacron orange SC, Synolon Blue KRD-SE, Lumacel Yellow HAC showed exhaustion above 80%. But Lumacron Yellow E3G exhausting to just 25%, the majority of this group fell within the range 40 ~ 80%

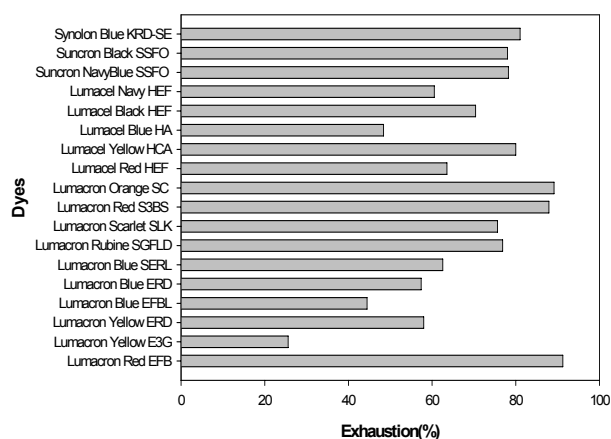


Fig. 1. Exhaustion rate on dyeing PLA with several Disperse dyes

4. REFERENCES

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