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Dyeing properties of new polyester fiber for super soft applications

Jae Hong Choi*, Eun Mi Kim

Department of Textile System Engineering, Kyungpook National University
1370 Sankyuk-dong, Buk-gu, Daegu, 702-701, Korea
E-mail: jaehong@knu.ac.kr

1. INTRODUCTION

Rayon-like polyester fiber has been commercialized by utilizing inorganic materials, such as $CaCO_3$, $BaSO_4$[1,2], which called 'Rayonmimetics(RMM)'. The new synthetic fiber using in this study, was made from high molecular weight of PEG(Polyethylene Glycol) prepared by a copolymerization.

RMM fiber has good drape and soft touch properties, can be used for super soft applications.

In this study, the dyeing characteristics and fastness of Rayonmimetics(RMM) fiber using with a range of commercial disperse dyes were examined and compared to those of regular PET fiber.

2. EXPERIMENT

2.1. Materials

100% regular PET and 100% RMM fabric were provided by Korea Dyeing Technology Center and Shin Poong Textile Co., respectively. The commercial dyes employed in this study are listed in Table 1.

Table 1. List of dyes used for this study

Manufacturer	Dye
M. Dohmen	E-type trichromat
	C.I. Disperse Yellow 54
	C.I. Disperse Red 60
	C.I. Disperse Blue 56
	S-type trichromat
	C.I. Disperse Orange 30
	C.I. Disperse Red 167

2.2. Dyeing and reduction clearing procedure

Fabric was dyed at a liquor-to-goods ratio of 10:1 in a dyebath containing disperse dye (2.0% o.w.f.) and dispersant 1g/ . Dyebath pH was adjusted to 4.0 using AcOH/NaOAc and then dyeing commenced at a dyebath temperature of 50 C, which was ramped up to the maximum dyeing temperature at a rate of 2 C/min. After holding at the maximum temperature(130) for 40min, the dyebath was cooled back to 70 C at a gradient of 2 C/min.

All dyeings were reduction cleared under the condition of 60 C containing NaOH 1g/ and $Na_2S_2O_4$ 1g/ for 20min.

2.3. Dye uptake and colorimetric properties

Dye uptake was determined spectro photometrically by measurement of the absorbance at λ_{max} using a UV-Vis spectrophotometer and the percentage of dye bath exhaustion (%E) was calculated. Colorimetric properties was expressed as *CIELAB* color co-ordinates, which was measured by CCM.

2.4. Wash, rubbing and light fastness testing

All fastness tests were performed after heat setting at 180 60sec.

The wash and rubbing fastness tests were conducted according to Marks & Spencer C4A and AATCC 8-1989 methods respectively. Light fastness was assessed following AATCC 16E-1987 method.

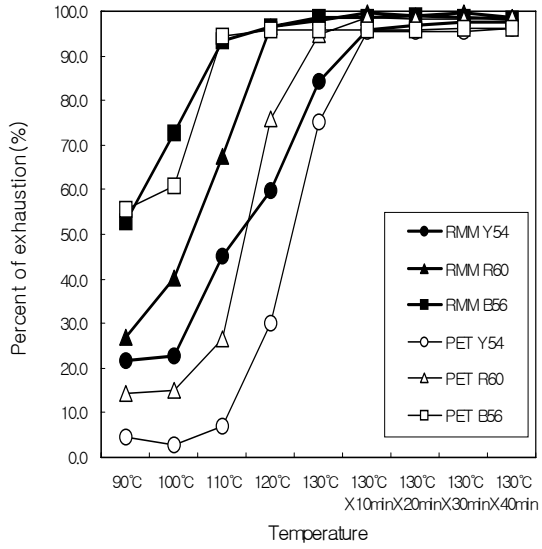

Figure 1. Comparison of dyeability between RMM and PET fiber with E-type disperse dyes.

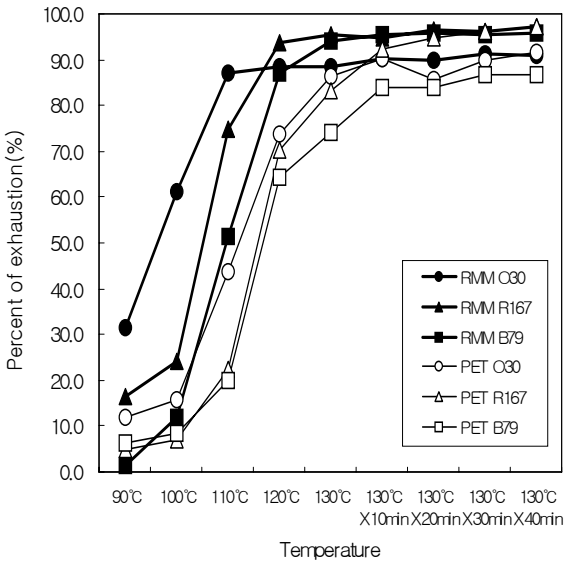

Figure 2. Comparison of dyeability between RMM and PET fiber with S-type disperse dyes.

3. RESULT AND DISCUSSION

On RMM fiber, all dyeings were found to exhibit exhaustion above 90% when applied at 120 C to 130. The critical range of dye adsorption for RMM fiber was observed between 110 to 120 which was lower than that of regular PET dyeings about 10 (figure 1, 2).

The dyeings of RMM showed lower L* and C* values compared with corresponding PET dyeings.

Table 2. Result of wash, rubbing and light fastness(gray scale, RMM/PET)

Dye	Wash fastness (nylon staining)	Light fastness	Rubbing fastness	
			Dry	Wet
Y54	3-4/4	4-5/4-5	4-5/4-5	4-5/4-5
R60	3/3-4	4/4-5	4/4	4-5/4-5
B56	3/3-4	4/4-5	3-4/4-5	3-4/4
O30	4-5/4-5	4/4-5	4-5/4-5	4-5/4-5
R167	3-4/3	4/4-5	4/4	4-5/4-5
B79	4/4-5	2-3/4-5	4-5/4-5	5/4-5

Color fastness, such as wash, rubbing, light, was revealed to be similar or lower about 0.5 grade to those of PET dyeings(table 2).

4. CONCLUSION

The dyeing characteristics and fastness of RMM fiber with commercial disperse dyes were examined and compared to that of PET dyeings. High exhaustion yields were achieved at 120 and 130 , dyeing where it ranged from 90% to 99%. Critical adsorption range of disperse dyes on RMM fiber was lower than regular PET fiber about 10 . Color shades of disperse dyes on RMM fiber tended to be duller than those of PET. Color fastness was revealed to be similar to those of PET dyeings.

REFERENCE

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