

A Study of the decrease in dye migration with Modified Nylon Fibers

HaeJung Lee, MoonJung Kim, JongYoon Kim, SsangHee Kim

Textile fusion technology R&D Department, Korea Institute of Industrial Technology,
Ansan-si, Gyeonggi-do, 425-791, South Korea
E-mail: hjlee@kitech.re.kr

1. INTRODUCTION

Development of fabric has been under way recently, which pursues to enhance 2 tone effect and touch of fabric by using both cationic dye and acid dye for joint dyeing through modified nylon.

But the problem of dyes migrating into the fabric occurred, so this study attempted to find out how to minimize the migration of fabric that contains modified nylon.

2. EXPERIMENTALS

2.1 Sample and Reagent

As for fabric, N/N twilled weaves (fabrics that contain modified nylon) were refined and used, and as for dye, total 12 kinds of Half milling type, Metal complex type, and Nylon Reactive type were used.

For leveling agent (Sera Gal N-FS : Dystar), anti-precipitator (Sera sperse M-IW:Dystar) and PH modifier (PK-45), the agents available at market were used.

Table 1. List of dyes

	Yellow	Red	Blue	Black
Half Milling	HMY1	HMR1	HMB1	HMBK
Metal Complex	MCY1	MCR1	MCR2	MCBK
Nylon Reactive	NR Y1	NRR1	NRB1	NRBK

2.2 Dyeing Process and Measurement of Absorption Rate

As for dyeing, dyestuff was set at concentration 1.0%o.w.f, which was maintained at 100°C for 60 minutes by using retardant 1.0g/l and acetic acid 0.5g/l(PH4.5-5.5). Bath ratio was set at 1:20. In addition, the absorption rate of dye for the sample was confirmed by using Dye-O-meter (Dye Max-L/Korea).

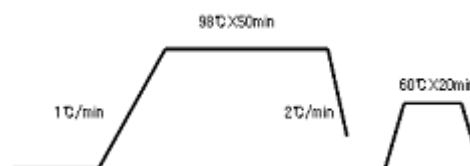


Fig.1 Process of dyeing

2.3 Confirmation of Migration and Comparison of Concentration

For fabrics dyed and migrated, colorimetric data were calculated by using spectrophotometer (Gretag MacbethTM 7000a-Color iControl), thereby comparing color tone and concentration.

2.4 Assessment of Color Fastness

Color fastness to washing (ISO 105 C01) and Rubbing (ISO X12) for fabrics dyed with 12 kinds of dyestuff was confirmed.

3. RESULTS AND DISCUSSION

3.1 Absorption Rate per Dyestuff

It was discovered that acid dyes have higher absorption rate than other types of dye, and that half-dyeing time of acid dyes is shorter than others.

Table 2. Final Absorbption rate(%) and Half-dyeing time(min)

Dyestuff	HM				MC				NR			
	Y1	R1	B1	BK	Y1	R1	B1	BK	Y1	R1	B1	BK
T^{1/2}(min)	27	33	16	40	35	37	45	43	30	36	46	56
Exhaustion(%)	90	88	99	90	99	94	88	81	92	86	81	80

3.2 Comparison of Migration Degree

It was concluded that all 4 kinds of acid dyes migrate nylon fabric very much, which is presumably caused by dyes (migrated into modified nylon) draining off during washing.

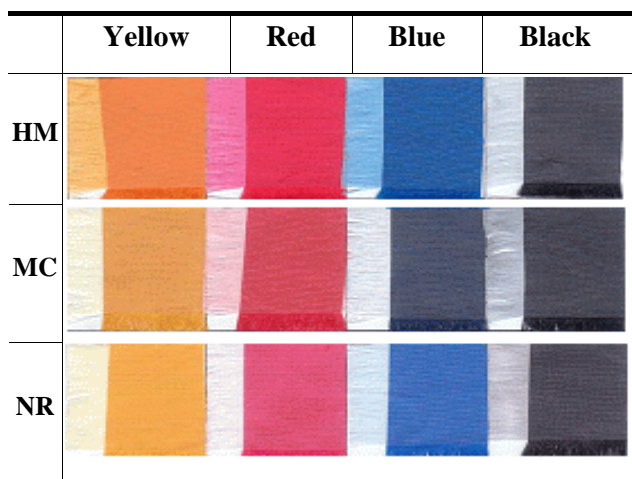


Fig.2 Comparison of Migration Degree
(HM, MC, NR)

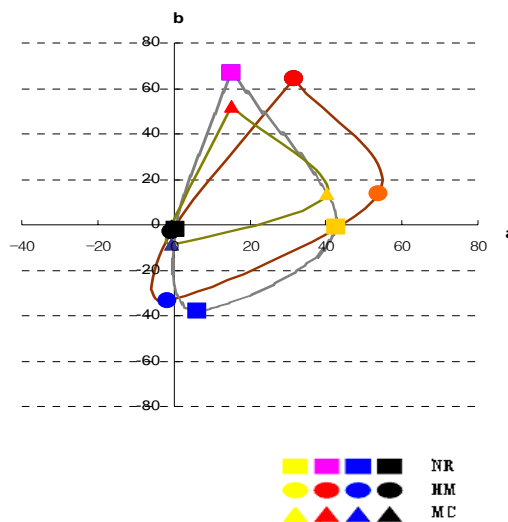


Fig.3 Color Range(Acid Dyestuff)

Table 3 . Dyeing fastness of HM, MC, NR
(fabric:N/N5312W)

type	Color Fastness								
	Washing							Rubbing	
	C/change	Acetate	Cotton	Nylon	PET	Acryl	Wool	Dry	Wet
HM	4-5	4	4	3-4	4	4-5	4-5	4-5	4-5
	4-5	4-5	3-4	2-3	4	4	4	4-5	4-5
	4-5	4-5	4-5	3-4	4-5	4-5	4-5	4-5	4-5
	4-5	4-5	4-5	4	4-5	4-5	4-5	4-5	4-5
MC	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
	4-5	4-5	4-5	4	4-5	4-5	4-5	4-5	4-5
	4-5	4-5	4-5	4	4-5	4-5	4-5	4-5	4-5
NR	4-5	4-5	4	4-5	4-5	4-5	4-5	4-5	4-5
	4-5	4-5	4	4-5	4-5	4-5	4-5	4-5	4-5
	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5

4. CONCLUSIONS

To embody two tone effects and various colors from modified nylon, it seems appropriate to select acid dyes of Metal Complex type (that has low migration to modified nylon during washing) or Nylon Reactive type, and use them jointly with cationic dyes.