Studies on Dyeing of Spun blend yarn with Cotton/Kenaf

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1. Introduction

Recently, many researches have focused on the eco-friendly materials nature derived resources. Kenaf is the ideal source of natural fibers for various Industries. Kenaf is highly efficient plant that requires less nutrients/energy and chemicals fertilizer for its fast growth and fully bio-degradable and can be recycled. kenaf have unique aesthetic properties that closely resemble the more expensive linen and that appeal to many consumers who are interested in "natural –looking" fabrics.

The object of this paper is to investigate dyeing characteristics in the Knitting fabrics by Spun blend yarn(Cotton/Kenaf)

2. Experimental

2.1 Materials

The pretreated fabric was knitted Spun blend yarn (Cotton /Kenaf=50:50), Commercial reactive dyes were used Sunfix, Sunzol and Suncion by product Oh Young Industrial Co. Ltd..

2.2 Dyeing

The knitting fabrics samples were dyed with the reactive dyes 3 combination(red, yellow, blue dyes) and black. The conditions for dyeing were as the following :

(1) Sunfix, Sunzol type : dyeing liquor ratio of 10:1, temperature was raised from 40℃ to the highest dyeing temperature at the rate of 1℃/min(60℃.), sodium carbonate was added, dyeing was continued at the highest dyeing temperature for 40min. and cooling down at 40℃ for 10min. The dyed sample was washed-off using soaping agent at 97℃ for 10min.

(2) Suncion type : above with same method was experiment but the highest dyeing temperature was 80℃

2.3 Colorfastness

Washing and heat treatment process after being rough, colorfastness to artificial light ISO 105 B02, colorfastness to domestic and commercial laundering ISO 105 C06-B1S, colorfastness to perspiration ISO 105 E04 where goes round strongly picking and colorfastness to rubbing ISO 105 X12 methods measured the specimen which is dyed.

3. Result and Discussion

3.1 Dyeing

In order to measure the dyeing chromatic consistency which is dyed colorimetry (Color i5, GretagMacbeth and U.S.A) used and measured reflexibility from the maximum absorption wavelength. And the dyed samples outer appearance in compliance with Kubelka-Munk consistency (K/S) got tightly.

Table 1. The Sunfix Type result of CCM

	L*	a*	b*	K/S
Yellow SPD 0.5%	73.56	17.14	59.41	3.130 (430nm)
Yellow SPD 1.0%	75.79	24.37	68.77	5.905 (430nm)
Yellow SPD 2.0%	71.48	31.17	75.20	10.569 (430nm)
Yellow SPD 3.0%	68.95	34.92	77.53	14.168 (430nm)
Red SPD 0.5%	55.52	51.64	-7.75	3.766 (550nm)
Red SPD 1.0%	48.15	56.66	-4.89	7.620 (550nm)
Red SPD 2.0%	42.40	58.50	-0.26	13.142 (550nm)
Red SPD 3.0%	39.00	58.18	3.28	17.881 (550nm)
Blue SBRN 0.5%	53.34	-3.55	-26.49	2.976 (620nm)
Blue SBRN 1.0%	45.38	-2.43	-28.90	5.369 (620nm)
Blue SBRN 2.0%	36.66	0.01	-29.99	9.846 (620nm)
Blue SBRN 3.0%	31.66	1.72	-29.95	13.987 (620nm)

Table 2. The Sunzol Type result of CCM

	L*	a*	b*	K/S
Yellow 2RN 0.5%	79.02	19.52	61.42	3.293 (430nm)
Yellow 2RN 1.0%	75.19	25.78	70.32	6.137 (430nm)
Yellow 2RN 2.0%	70.93	32.09	76.24	10.758 (430nm)
Yellow 2RN 3.0%	68.51	35.10	77.46	13.723 (430nm)
Red BB 0.5%	57.73	53.72	-1.76	3.713 (520nm)
Red BB 1.0%	51.04	58.22	1.73	7.161 (52nm)
Red BB 2.0%	44.40	59.63	6.79	13.468 (520nm)
Red BB 3.0%	42.13	59.28	8.96	16.256 (520nm)
Blue BB 0.5%	61.91	-8.76	-23.71	1.787 (620nm)

Blue BB 1.0%	53.33	-8.65	-28.96	3.477 (620nm)
Blue BB 2.0%	44.86	-8.08	-28.96	6.518 (620nm)
Blue BB 3.0%	39.55	-6.91	-29.10	9.355 (620nm)

Table 3. The Suncion Type result of CCM

	L*	a*	b*	K/S
Yellow H-E4G 0.5%	89.62	-4.44	52.17	2.361 (380nm)
Yellow H-E4G 1.0%	88.75	-2.01	62.44	3.814 (380nm)
Yellow H-E4G 2.0%	86.68	1.65	77.04	7.620 (380nm)
Yellow H-E4G 3.0%	85.48	3.97	82.68	9.988 (390nm)
Red H-E7B 0.5%	57.51	47.40	-9.12	2.900 (560nm)
Red H-E7B 1.0%	50.53	52.47	-7.40	5.433 (560nm)
Red H-E7B 2.0%	43.19	55.75	-2.68	10.704 (560nm)
Red H-E7B 3.0%	40.00	56.18	0.16	14.448 (55nm)
Blue H-EGN 0.5%	62.65	-11.73	-31.57	2.682 (640nm)
Blue H-EGN 1.0%	52.83	-10.56	-37.80	6.441 (640nm)
Blue H-EGN 2.0%	45.59	-8.03	-39.86	11.336 (640nm)
Blue H-EGN 3.0%	38.34	-3.70	-41.48	18.318 (640nm)

Table 4. The Sunzol Type(Black) result of CCM

	L*	a*	b*	K/S
Black NWR 8%	16.58	0.58	-0.77	24.262 (600nm)
Black NWR 10%	15.62	0.54	-0.73	26.482 (600nm)
Black NWR 12%	14.74	0.62	-0.55	28.594 (590nm)

3.2 Colorfastness

Colorfastness the result of test with afterwords is same.

Table 5. Colorfastness to rubbing

Sample	Result		Sample	Result	
	dry	wet		dry	wet
① Sunzol Black-NWR	5	4	⑥ Sunzol Yellow 2RN	5	4-5
② Suncion Red H-E7B	5	4-5	⑦ Sunzol Blue BB	5	4-5
③ Sunzol Yellow H-E4G	5	4-5	⑧ Sunfix Red SPD	5	4-5
④ Suncion Blue H-EGN	5	4-5	⑨ Sunfix Yellow SPD	5	5
⑤ Sunzol Red BB	4-5	4-5	⑩ Sunfix Blue SBRN	5	4-5

Table 6. Colorfastness to artificial light

Sample	Result	Sample	Result
① Sunzol Black-NWR	4	⑥ Sunzol Yellow 2RN	4
② Suncion Red H-E7B	4	⑦ Sunzol Blue BB	4
③ Sunzol Yellow H-E4G	4	⑧ Sunfix Red SPD	4
④ Suncion Blue H-EGN	4	⑨ Sunfix Yellow SPD	4
⑤ Sunzol Red BB	4	⑩ Sunfix Blue SBRN	4

Table 7. Colorfastness to domestic and commercial laundering

Sample	Color change	Staining					
		Acetate	Cotton	Nylon	Poly	Acylic	Wool
① Sunzol Black-NWR	4-5	4-5	5	4-5	5	5	4-5
② Suncion Red H-E7B	4-5	4-5	5	4-5	5	5	4-5
③ Sunzol Yellow H-E4G	4-5	4-5	5	4-5	5	5	4-5
④ Suncion Blue H-EGN	4-5	4-5	5	4-5	5	5	4-5
⑤ Sunzol Red BB	4-5	4-5	5	4-5	5	5	4-5
⑥ Sunzol Yellow 2RN	4-5	4-5	5	4-5	5	5	4-5
⑦ Sunzol Blue BB	4-5	4-5	5	4-5	5	5	4-5
⑧ Sunfix Red SPD	4-5	4-5	5	4-5	5	5	4-5
⑨ Sunfix Yellow SPD	4-5	4-5	5	4-5	5	5	4-5
⑩ Sunfix Blue SBRN	4-5	4-5	5	4-5	5	5	4-5

Table 8. Colorfastness to perspiration

Sample		Color change	Staining					
			Acetate	Cotton	Nylon	Polyester	Acylic	Wool
① Sunzol Black-NWR	Acid	4-5	4-5	4	4-5	4-5	4-5	4-5
	Alkali	4-5	4-5	3-4	4	4-5	4-5	4-5
② Suncion Red H-E7B	Acid	4-5	4-5	4	4-5	4-5	4-5	4-5
	Alkali	4-5	4-5	4	3	4-5	4-5	4
③ Sunzol Yellow H-E4G	Acid	4-5	4-5	4-5	5	5	5	4-5
	Alkali	4-5	4-5	4-5	5	5	5	4-5
④ Suncion Blue H-EGN	Acid	4-5	4-5	3-4	4-5	4-5	5	4-5
	Alkali	4-5	4-5	3	3	4-5	5	4
⑤ Sunzol Red BB	Acid	4-5	4-5	4	4-5	5	5	4-5
	Alkali	4-5	4-5	4	4	5	5	4-5
⑥ Sunzol Yellow 2RN	Acid	4-5	4-5	5	4-5	5	5	4-5
	Alkali	4-5	4-5	5	4-5	5	5	4-5
⑦ Sunzol Blue BB	Acid	4-5	4-5	5	4-5	5	5	4-5
	Alkali	4-5	4-5	5	4-5	5	5	4-5
⑧ Sunfix Red SPD	Acid	4-5	4-5	3-4	4	4-5	4-5	4-5
	Alkali	4-5	4-5	3	2-3	4-5	4-5	4-5
⑨ Sunfix Yellow SPD	Acid	4-5	4-5	5	4-5	5	5	4-5
	Alkali	4-5	4-5	5	4	4-5	4-5	4-5
⑩ Sunfix Blue SBRN	Acid	4-5	4-5	5	4-5	5	5	4-5
	Alkali	4-5	4-5	5	4-5	5	5	4-5

4. Reference

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