

The Effect of Leveling Agents in the ULLR of Cotton

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Abstract

Energy saving and environment-friendly dyeing method of cotton with reactive dyes is the ultra low liquor ratio dyeing because it reduces the total quantity of water, dye, salt and alkali during the dyeing process in the effluent as well as the energy consumption. However, this method may not guarantee the quality of the dyeing results due to the specs or unlevel dyeing depending upon the dyes used. The study has focused on the effect of leveling agents in the dyeing of cotton with reactive dyes under the ultra low liquor ratio (1:5). Especially Sunfix N/B MF-D which was selected for ULLR showed low-leveled dyeing comparing with the other MF-D series. A leveling agent having polycarbonate structure increased LDF values of Sunfix N/B MF-D without changing of dyeing fastness. We recommend some leveling agents to improve the leveling behavior for ULLR dyeing

1. Introduction

In dyeing and finishing industry, the ULLR dyeing processes were applied to promote energy saving and pollutant reduction since the characteristics of dyeing method such as high exhaustion and fixation properties, as well as the use of low-salt, low alkali with reduced volumes. In present study, the leveling behavior of reactive dyes on cotton was investigated by monitoring level dyeing factor of MF-D series dyes. Among those, Sunfix N/B MF-D showed the lowest LDF in the ultra low liquor ratio dyeing. We focused on the level dyeing factor of Sunfix N/B MF-D using commercially available leveling agents.

2. Experimental

2.1 Instruments

The dyeing machine and pot designed for the ULLR dyeing were used.

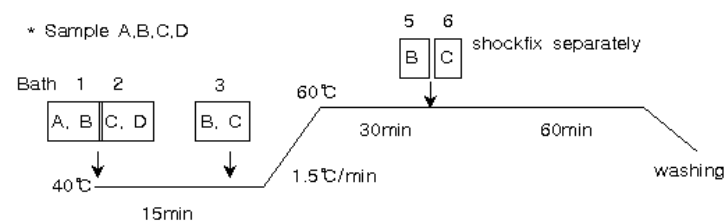
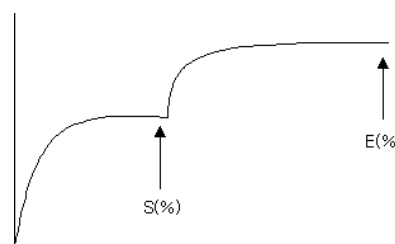


Picture 1. Dyeing machine for ULLR dyeing

2.2 Measurement

2.2.1 Measurement of Level Dyeing Factor

The leveling behavior of reactive dyes on scouring and bleaching cotton was investigated by monitoring the value of migration index, substantivity and exhaustivity.



* Migration Index = (strength of sample C/strength of sample B)×100 (Optimum migration = 100)

* Level dyeing Factor(LDF) 단위:%

$$LDF = S / E \times MI$$

S: Substantivity E: Exhaustivity

2.2.2 Measurement of surface optical density

K/S was measured by Kubelka-Munk equation at CCM(datacolor)

$$K/S = (1-R)^2 / 2R$$

K: coefficient of absorption

S: coefficient of scatter

R: Reflectance of the sample at a given wavelength

2.2.3 Measurement of fastness

Various fastness properties of dyeing samples were measured. Light fastness was evaluated according to KS K 0218 direct-illumination method, washing fastness according to KS K 030 A-4.

3.Results and Discussion

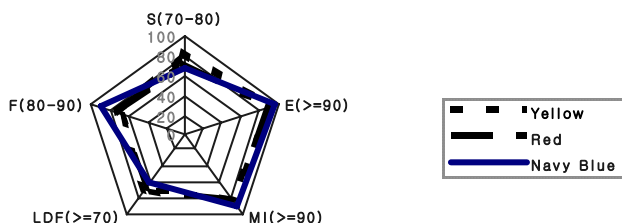


Fig 1. Level Dyeing Factor of MF-D type dyes

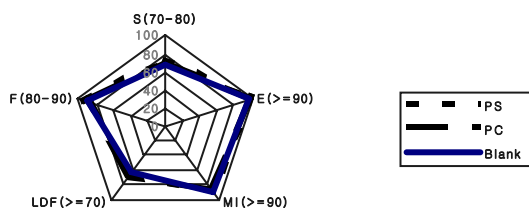


Fig 2. Level Dyeing Factor According to Leveling agents

	Rubbing		Washing fastness staining(3%owf)					
	Dry	Wet	A C E T A T E	C O T T O N	N Y L O N	P E T	A C R Y L	W O L
Blank	4	3	5	5	5	5	5	5
PC	4	3	5	5	4-5	5	5	4
PS	4	2-3	5	5	4-5	5	5	5

Table 1. Dyeing fastness of Cotton According to Leveling agents

Fig 1,2 showed the effect of the leveling agents on level dyeing factor. PC leveling agent having polycarbonate structure increased LDF values of Sunfix N/B MF-D without changing of dyeing fastness.

4. REFERENCES

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