보온경량성 직물용 나일론 중공사의 염색성 비교

Comparison of dyeing properties of nylon hollow fiber used for heat-insulating lightweight fabrics

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Abstract

Hollow fibers have been used in rather different fields of general textile use and in special-purpose products because of their unique structure. Hollow fibers have profitable properties for some applications because of their large surface/volume ratio. In this paper, dyeing properties of nylon hollow fiber were investigated. Nylon regular fiber and hollow fiber were used in the dyeing experiment. The samples were dyed with three kinds of acid dyes. Effects of dyeing temperature, pH of the dye bath, and dye concentration on dyeing properties were examined.

1. Introduction

In recent years, considerable changes have taken place in the development of various structural modifications of fibers. There can be no doubt that among these textile products, hollow fibers may be mentioned as good examples. The structure of hollow fibers differs rather significantly from the structure of fibers without longitudinal voids. Because of their unique structure, hollow fibers have been used in rather different fields of general textile use and in special-purpose products. Hollow fibers have profitable properties for some applications because of their large surface/volume ratio. Hollow fibers enable heat transfer, the cleaning and separation of various liquids and gases, higher moisture absorption and adsorption, and so forth. There have been several researches for the dyeing of regular nylon fibers, but papers concerning dyeing properties of hollow nylon fiber are rare.

In this paper, dyeing properties of nylon hollow fiber were investigated. Nylon regular fiber and hollow fiber were used in the dyeing experiment. The samples were dyed with three kinds of acid dyes. Effects of dyeing temperature, pH of the dye bath, and dye concentration on dyeing properties were examined.

2. Experimental

The standard dyeing conditions using IR dyeing machine (KSL-24 PERFECT, korea Science CO., LDT) were as

follows: dyeing solution was prepared using liquor ratio 1:50, and the dyeing conditions are shown in Table 1.

Table 1. Dyeing conditions of three kinds of acid dyes

Dyes (C. I. number)	Type	% o.w.f	pH	Temp(°C)
C. I. Acid Red 4	Leveling type	1,3,5	2, 3	70, 90, 110
C. I. Acid Yellow 44	Half milling type		4, 5	
C. I. Acid Blue 193	Milling type		6, 7	

The extent of exhaustion (%) was measured with UV spectrophotometer using equation (1):

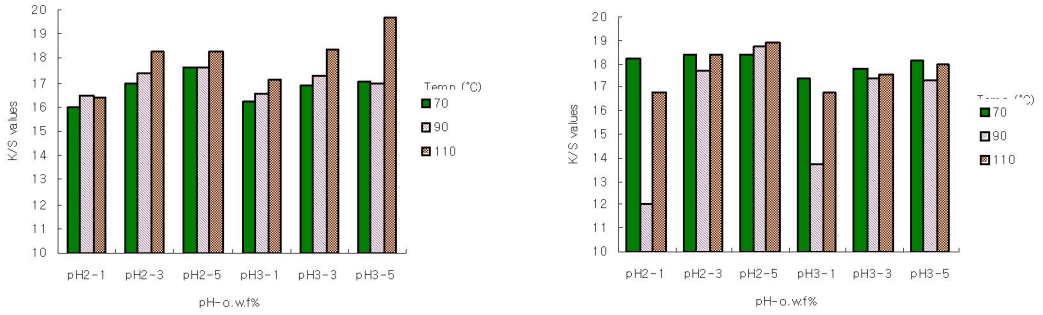
Extent of exhaustion (%) = [1 − (At/A0)]x100 (1)

Where, A0:initialopticaldensityofdyeingsolution

At:opticaldensityofdyeingsolutionafterdyeingtimet

Wash fastness, light fastness, crock fastness were assessed in accordance with KS K ISO 105 C06-A1S, KS K 0650, KS K ISO 105 B 02- Xenon Arc Lamp, respectively.

3. Results and discussion



(a) regular fiber (b) hollow fiber

Fig.1. K/S values of regular and hollow nylon fiber.

Table 2. Wash fastness, light fastness, crock fastness of regular and hollow fiber.

	Nylon	Hollow1	Hollow2	Hollow3	Hollow4	Hollow5
세탁견뢰도						
변퇴색	4~5	4~5	4~5	4~5	4~5	4~5
오염 - acetate	3~4	3	3	3~4	3	3
- nylon	2~3	2	2	2~3	2	2
- polyester	4~5	4~5	4~5	4~5	4~5	4~5
- acrylic	4~5	4~5	4~5	4~5	4~5	4~5
- wool	3	2	2~3	3	2~3	2~3
마찰견뢰도						
오염 - 건조마찰	4~5	4~5	4~5	4~5	4~5	4~5
- 습윤마찰	1~2	2	2	2~3	2	2
일광견뢰도						
변퇴색	4~5	4~5	4~5	4~5	4~5	4~5

References

1. K. S. Lee, B. S. Lee, Y. H. Park, Fiber and Polymers, Vol. 6, No.1, 35-41(2005).

2. J. S. Hwang, H. T. Cho, Textile Science and Engineering, Vol. 43, No. 1(2006).

3. W. K. Chung, Journal of the Korean Society of Textile Engineers and Chemists, Dec.(1973).

4. D. S. Leong, D. H. Lee, M. C. Lee, Journal of the Korean Society of Dyers and Finishers, Vol. 11. No. 6 (2002. 12).

5. D. Petrulis, Journal of Applied Polymer Science, Vol. 92, 2017-2022(2004).

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