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Research of the Process of Dying of Blended Fabric from Bamboo and Modified Nitron Fibers

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Annotation: This article presents the results of studies of the process of dyeing a mixed fabric made of bamboo and modified nitrone fibers. The color characteristics of mixed fabrics based on bamboo fibers and nitron fiber modified with a solution of natural silk waste with active dyes have been studied.

Keywords: modified nitron, bamboo, modification, nitron fiber, blended fabric, dyeing and reactive dyes.

The range of textile materials from mixtures of natural and chemical fibers is systematically expanding. This is due to the need to replenish the shortage of natural fibers by increasing production and expanding the scope of application of chemical fibers, the possibility of purposefully imparting a set of valuable properties to products - form stability, wear resistance, hydrophilicity or hydrophobicity, the need to replace natural fibers with valuable consumer properties with chemical fibers and their mixtures in the sphere of technical application.

The development of the textile industry depends on the availability of local fibrous raw materials. Therefore, in the context of the transition to a market economy in the Republic of Uzbekistan, a direction has been adopted, a deeper processing of fibrous raw materials, a decrease in the share of its exports and an increase in the volume of exports of finished products.

In the world, the upward trend in the share of chemical fibers in the total production of fiber raw materials continues. The growth in the world consumption of textile fibers is associated with the development of the production of chemical fibers based on cellulose hydrate.

In the textile industry, they are processed both in pure form and in a mixture with natural and synthetic fibers.

As you know, the use of mixtures of natural and chemical fibers allows you to expand the range of textile products, opens the way to obtaining materials with new operational properties. World experience in the textile processing of mixtures of fibers with different chemical natures shows that each mixture of fibers must be considered as a new type of textile raw material.

For each fiber blend, it is important to apply optimal processing conditions and processing processes.

Improving the quality of consumer goods is becoming the most urgent task, because it creates favorable conditions for expanding the range and improving the quality of consumer goods, the solution of which is carried out continuously and with the greatest efficiency at all levels of the national economy.

The chemical finishing process of blended fabrics, knitted fabrics or yarns is an important stage in the research of the entire production process of finished textile products. When it comes to finishing textile materials, the process is complicated by the presence of two (sometimes three) fibrous components in the system, which differ in their relationship to the chemical reagents used in finishing operations.

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On an industrial scale, only copolymer PAN fibers are produced, this is due to the brittleness of homopolymer fibers and its poor dyeability.

A technology has been developed for obtaining a modifying agent for nitron fiber from natural silk waste in a high-frequency radiation field. To improve the properties, PAN was modified with a solution of natural silk waste [1].

For the preparation of mixed fabrics based on modified nitrone, they were carried out according to the one-way method, using sodium carbonate as an alkaline agent. The indicators of capillarity and the degree of whiteness of mixed materials modified nitron / bamboo and modified nitron / cotton have been investigated.

Fabric preparation mode for dyeing:

Surfactant firm "Ves kim", g / l 1.0

Sodium silicate, g / l 30.0

Hydrogen peroxide, g / l 2

Sodium carbonate, g / l 0.5-2

Processing time, min 60

Processing temperature, 0C 98

The influence of the concentration of soda on the capillarity and whiteness of mixed fabrics was studied. The data obtained are shown in table 1.

Table 1. Results of the study of preparation for dyeing of mixed materials

Samples Indicators	Modified nitron / bamboo				Modified nitron / cotton			
Sodium carbonate, g / l	0,5	1,0	1,5	2,0	0,5	1,0	1,5	2,0
Capillarity, mm / hour	114	124	156	187	123	145	134	172
Whiteness,%	67,90	71,34	72,08	82,45	62,07	73,12	77,66	80,81

Requirements in accordance with GOST (GOST -29104.11-91) for cotton textile materials, capillarity is not less than 125 mm / hour, the degree of whiteness is not less than 80% (GOST 18057-72).
The results shown in table 1 show that at a concentration of 1.5-2.0 g / l of sodium carbonate, the quality indicators of the capillarity and the degree of whiteness have relatively high values than with the single-bath process.

Although the mixes had high capillarity values, their degree of whiteness does not meet the requirements of GOST. This is especially pronounced in a mixture where modified nitrone and cotton are present. Nitron fiber acquires yellowness due to the hydrolysis reaction under the action of soda ash, which is accelerated in the modified nitrone, due to its higher porosity.

For dyeing mixed fabrics based on modified nitrone and bamboo fibers, active dyes were chosen.

The fixation of active dyes by a fibrous material is a heterogeneous process that occurs in the fiber phase according to the scheme: diffusion of the dye inside the fiber, sorption of the dye in the fiber structure, chemical reaction with the fiber.

According to the one-bath dyeing method, the dye and the alkaline agent are combined in one bath. From the point of view of instrumental design, these methods are more convenient and simpler than two-bath methods, but at the same time there is a danger of dye hydrolysis. Therefore, in single-bath methods, either low-reactive dyes or weakly alkaline agents should be used.

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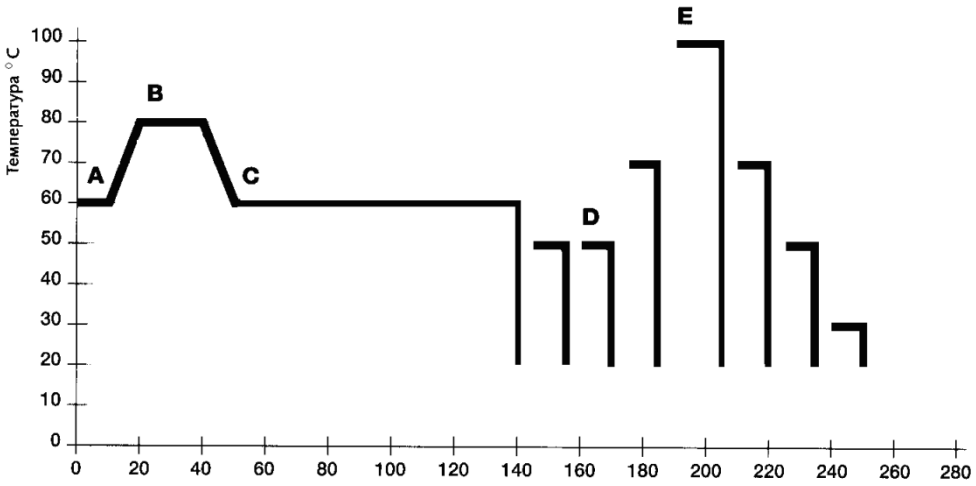
To reduce the risk of hydrolysis of active dyes, paddles with a small trough volume are used, and a solution of dye and an alkaline agent is fed through a special mixing dosing device, in which the solutions are mixed immediately before padding in a trough, in which the mixture is only a few seconds.

A very simple plus-bicarbonate method finds practical application, in which the textile material is added with an alkaline dye solution, and the fixation is carried out at the drying stage [2].

We have studied the process of dyeing mixed fabrics (modified nitrone / bamboo and modified nitrone / cotton) with active dyes.

Dyeing of mixed samples was carried out according to the following two dyeing modes:

Dyeing scheme with active dyes



Note: A-surfactant and electrolyte

B-dye

C-alkaline agent

D, E-final finishing

Dye bath composition, g / l:

Dye-3% (based on fiber weight)

Veskim CAM -1

NaCl -10-90

Na2CO3 -5

Bath module – 30

Along with mixed samples, bamboo, cotton, modified nitron fibers were dyed under identical conditions. All stained samples after washing were subjected to color intensity measurements. The results are shown in Table 2.

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Table 2. Color intensity of stained samples with reactive dyes

Samples	Color intensity, K / S
Cotton fabric	12,1
Bamboo fabric	14,2
Modified nitron	11,0
Modified nitron / cotton	12,5
Modified nitron / bamboo	13,6

The dyeing ability of bamboo fabrics is better than that of other cellulose fibers, as indicated by the results of determining the color intensity of bamboo-containing fabrics.
The dyeing results show that with the addition of the bamboo component, the color intensity increases. The color intensity of the mixture with the inclusion of the modified nitrone is higher than that of the mixture with the inclusion of nitrone. This again indicates that the protein in the modified bath is firmly held by the nitrone fiber.

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