PROCESSES OF BLEACHING AND DISCOLOURING OF WOOL FIBERS

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Annotation: *The main part of local wool fibers grown in the country is coarse and semi-coarse. It is advisable to produce high-quality yarn, textiles and non-woven products from wool from local sheep, goats and camels. At the same time, improving the surface appearance of products will lead to an increase in demand, the technology of bleaching, discoloring of wool fiber on the basis of local raw materials has been developed and the technology of production of non-woven fabrics of different thicknesses has been expanded.*

Keywords: *Wool, fabrics, bleaching, discolouring, sheep's coarse wool, durable, white wool, coding, solution, surfactant, black, dark brown, industryl, agricultural products, cotton fiber, flat, dyed, wool fabrics for suits and shirts.*

It is known that usually black and dark brown wool fibers are not bleached, they are discolored when used in the textile industry, and light-colored or white wool is bleached when necessary. Usually fine fine wool and semi-coarse wool are almost colorless, from which it is possible to make assortments of fabrics of different colors. Such wool does not contain natural pigments, ie fiber, or has a very small amount of fiber. Coarse wool can be light yellow-brown to dark brown, or even black.

Since the pigments that color the fibers are chemically bound to keratin, it is necessary to take into account the preservation of keratin not to damage it in the organization of the processes of their removal from the fiber. Pigments are resistant to weak solutions of alkalis or acids, but are resistant to oxidizing and reducing agents. Using these properties of pigments, studies have used oxidizing, i.e. hydrogen peroxide, to bleach wool fibers.

In the study, white, yellow, cream, blue and brown coarse wool fibers of the local breed were obtained as the object. The color intensity and whiteness of the primary processed wool fiber were determined on the Minolta spectrocolorimeter. The washing quality is assessed by maintaining the fiber length and increasing its moisture content and water absorption. Anionactive SAM - sulfanol NP-1, ionogenic SAM - prevotsel V-OF were used as surfactants in the experiments.

The effect of the nature of the surfactant on the color intensity and whiteness level of the wool fiber is given in Table 1.

Table 1.

The effect of the composition of the solution on the color intensity and whiteness level of the wool fiber

SAM type	Properties of sheep wool			
	Colour intensity, K / S	Whiteness level, W,%	K / S change, %	W change, %

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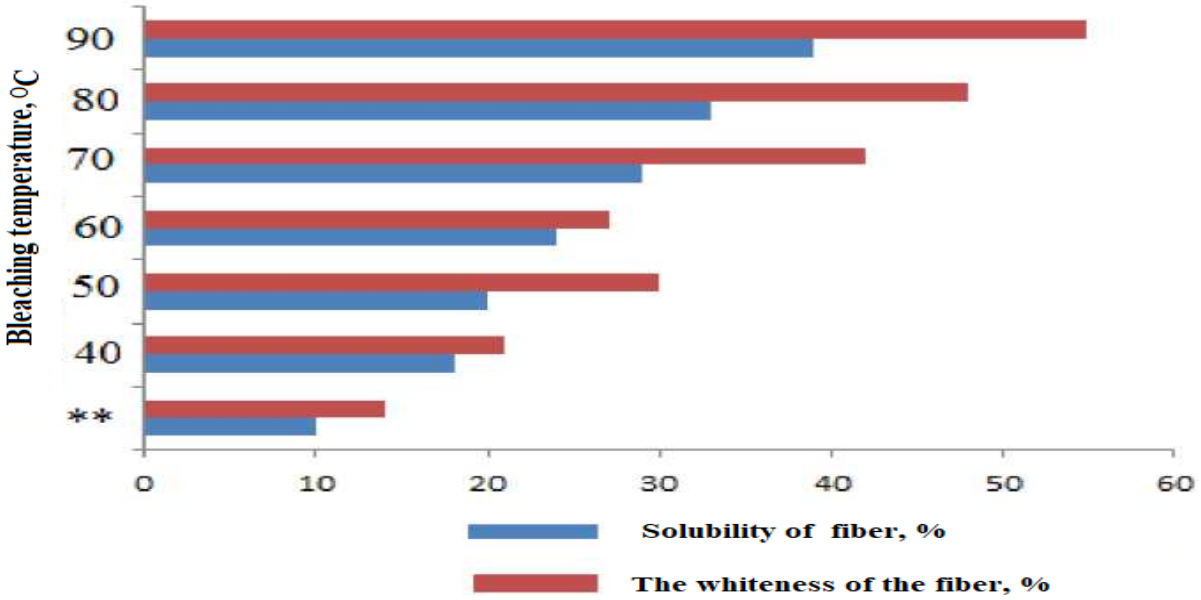
	before the process	after the process	before the process	after the process		
Sulphonyl NP-1	27	14	14,21	29,91	- 48	+ 110,5
Prevocel V-OF	26	14	14,88	30,46	- 46	+ 104,7

Note: t =50°C



Bleaching and discolouring processes of washed white, yellow, cream, blue and brown wool fibers were carried out. The composition of the solution consists of hydrogen peroxide as a bleach, sodium silicate as a stabilizer and SAMs of various activities.

From the data presented in the table, it was found that the nature of SAM in the bleaching process has almost no effect on the whiteness level and color intensity of the fiber.

Hydrogen peroxide decomposes to form a per hydroxide-ion . Since this ion is not stable, it forms atomic oxygen. It is known that in alkaline environments and at high temperatures, hydrogen peroxide decomposes to water and atoms to oxygen. Solid decomposition of hydrogen peroxide by a radical-chain mechanism leads to the inefficient consumption of hydrogen peroxide and the destruction of keratin by cystine and peptide bonds, which are severe under the influence of certain metals (iron, manganese, etc.) and their compounds. The sodium silicate included in the solution prevents the catalytic decomposition of hydrogen peroxide and ensures the alkalinity of the solution.

Taking the above into account, and because the whiteness level of the wool fiber did not meet the requirement, the effect of the process temperature on the fiber quality was studied (Fig. 1).

Figure 1. The solubility of the fiber and the degree of whiteness depend on the duration of the

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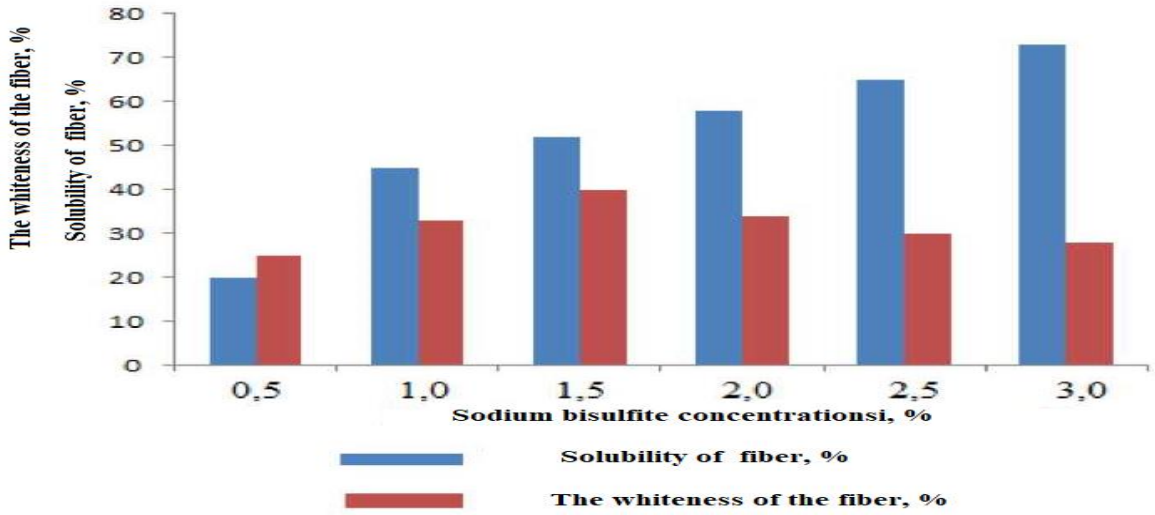
bleaching process.

The quality of the bleaching process is assessed by the degree of whiteness of the wool and the destruction of keratin. As can be seen from the diagram, the dissolved fraction of wool that has not undergone bleaching is 10-12%. In bleached fiber, this value ranges from 18% to 40%. In this diagram, it is shown that as the temperature of the bleaching process increases, the degree of whiteness of the fiber increases in direct proportion to it. However, if the destructive value of the wool is 30%, it means that the wool has been deeply destroyed. This can be explained by the rupture of transverse covalent bonds in the wool macromolecule and the formation of coimolecular peptides. In view of the above, a temperature of 500C was found to be the most optimal for the bleaching process.

The results of the present study did not achieve a high degree of bleaching of wool fibers, so in subsequent studies, bleaching under the influence of fiber repellents was studied. Sodium bisulfite is



used as the main reagent in the solution when bleaching wool fibers with the help of reducing agents. Bleaching in bisulfite solution was carried out at room temperature for one day in 0.5-3.0% sodium bisulfite solution with a modulus of 20. The fibers were then compressed and treated with a solution of sulfuric acid (5% by mass) for 15 minutes, then washed with water. The results of a study on bleaching of wool fiber under the influence of reductants are shown in Figure 2.

Figure 2. Effect of sodium bisulfite concentration on wool fiber quality

From the data given in the diagram, we can see that an increase in the concentration of the reducing agent in the bleaching solution to 1.5% leads to an increase in the whiteness of the fiber and then to the yellowing of the fiber. As the reflector concentration increases, the mass loss of the fiber increases. In addition, bleaching of wool fibers with reflectors was found to be ineffective because the whiteness of the fibers bleached with reflectors was not stable.

Under the proposed conditions, wool fibers of different colors were bleached. The results are presented in Table 2.

Table 2

Whiteness levels of wool fibers of different colors bleached using hydrogen peroxide

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Wool fibers of different colours	Whiteness of raw wool, W,%	Whiteness of washed wool, W,%	Whiteness of wool bleached with hydrogen peroxide, W,%
White colour	14.9	24.7	30,0
Cream colour	10.3	11.6	20,7
Yellow colour	8,9	10.3	17.7
Grey colour	5,3	7,2	13.9
Brown colour	0.3	0.5	1.8

Therefore, the following technology for bleaching local wool fibers with hydrogen peroxide was proposed: Wool fiber containing 30% hydrogen peroxide solution (2% by weight of wool), sodium silicate (2% by weight of wool), SAM (1 g / l) the solution is treated at a temperature not exceeding 500C for 1 hour. Then the solution is stopped heating and bleached while stirring in a cold solution.

CONCLUSION

Optimal conditions for the process of cleaning the local coarse wool fiber from various contaminants have been developed to obtain the desired product by softening the wool fiber during the washing process.

The technology of bleaching and discolouring of wool fibers on the basis of local raw materials has been developed, and the technology of production of fabrics of different thicknesses from the obtained wool fibers has been developed;

Wool fabrics are available in a wide range, with woven and non-woven fabrics. Its uniqueness is its heat-retaining properties, which requires that these fabrics be used in the national economy for warm and winter clothing.

Given the classification and coding of woolen fabrics, they play an important role and allow automated processing of product information in all areas of activity, the study of consumer properties and quality of the product, the organization of rational accounting in stores and racks.

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