ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 8, Issue 9 , September 2021

Study of the Effect of Aldehydes on Lightfastness and Physical and Mechanical Properties of Karakul Skins

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ABSTRACT: The article studies the effect of aldehydes on lightfastness and physical and mechanical properties of chick peels. In this case, we compared the tensile strength of karakul, tanning with glutaraldehyde and formaldehyde at a concentration of 1, 3, 5 g / l. At a glutaraldehyde concentration of 3 g / l, the fur of the astrakhan fur was the best.

KEY WORDS: Formaldehyde, glutaraldehyde, tanning, hydrothermal destruction, moisture, karakul skins.

I. INTRODUCTION

In the course of the research, we studied the chemical and physical-mechanical properties of semi-finished and finished skins, lightfastness, grindability, tensile strength, etc. Indicators [1-2].

Grindability was determined by the weight loss of the semi finished product before and after grinding, the light intensity - by the method of irradiation of the skins under a PRK-2 mercury-quartz lamp (distance from the lamp to the irradiated skins is 25 cm, the duration of irradiation is 48 hours). The lightfastness of the finished product was assessed visually-organleptically using a ten-point system (10 points - no significant color change is observed).

II. EXPERIMENTAL PART

A. METHODS AND MEANS OF RESEARCH

Karakul literally translates from Turkic, black as ash (karakul) - skin with fur, removed from lambs of the Karakul breed on days 1-3 after birth, when their wool is distinguished by a thick, elastic, silky hair, forming curls of various shapes and sizes [3].

Glutaraldehyde - (glutaraldehyde, pentanedial) is an organic compound, an aldehyde with the chemical formula $C_5H_8O_2$. Transparent and colorless liquid, easily soluble in water, irritating to eyes and lungs. It is used as a tanning agent in the production of leather, and is also used in the textile industry and microscopy [4].

Determination of moisture content was carried out in accordance with GOST 938.1 [5]. The moisture content in the skin was determined by measuring the weight loss of the crushed sample dried at a temperature of 128-130 ° C.

Moisture content x, %, was determined by the formula:

$$x = \frac{a-b}{a} \cdot 100$$

where, a is the weight of the skin before drying, g; b - weight of the skin after drying, g. The deviation of the results of the analysis of parallel determinations from the arithmetic mean was no more than ± 0.2%.

Determination of resistance to bending. The resistance to bending in dry and wet conditions during scientific research was tested, respectively, in accordance with GOST 938.0. Two samples were cut out (in the longitudinal and transverse directions) with a size of 25 × 100 mm. The tests were carried out on an RT-250 tensile testing machine.

$$A = H / T$$

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where H is the bending load of a wet or dry sample, N; T is the thickness of the dry sample, m. The result of the determination was the arithmetic mean of all longitudinal and transverse samples [6].

III. RESULTS AND DISCUSSION

Table 1 shows the research results depending on the properties of the semi-finished product on the consumption of various tanning agents, obtained in the study on six skins in each option.

Table 1

Properties of astrakhan semi-finished product, depending on consumption of various tanning agents at a moisture content of 45%

№	Index	Aldehyde consumption, g / l					
		Formaldehyde			Glutaraldehyde		
		1	3	5	1	3	5
1.	Strength limit when stretched, MPa	0,641	0,653	0,648	0,817	0,826	0,820
2.	Stress when cracks appear in the face layer, MPa	0,252	0,264	0,259	0,274	0,293	0,83
3.	Elongation at stress 4,9 MPa, %	45,6	43,8	44,0	44,1	40,7	42,4
4.	ydrothermal destruction, °C	76	79	82	75	78	81
5.	Chromium oxide, %	4,8	5,1	5,2	5,1	5,2	5,3
6.	Lightfastness, points	7	9	8	8	10	9

The selection of samples for physical and mechanical tests was made from the corresponding areas, the average between the longitudinal and transverse samples.

From the given in table. 2 data determined that the best physical and mechanical properties are achieved at a consumption of glutaraldehyde 3.0 g / l. The decrease in the strength parameters of skins treated with glutaraldehyde in an amount of more than 3.0 g / l can be explained by the increasing structuring action of the aldehyde. Glutaraldehyde in this case reduces the physical ability of structural elements to orientate, which leads to a decrease in the strength of the astrakhan dermis.

To compare the indicators of physical and mechanical properties and chemical analysis of finished astrakhan skins when treated with aldehydes, studies were carried out on 36 skins by the method of alternating half-wines. Control half-skins were treated with formaldehyde, experimental ones with glutaraldehyde (1.0-5.0 g / l each). The rest of the processes and operations of the technology were identical in the established methods. The research results are shown in table. 2

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Table 2

Physical and mechanical properties and chemical analysis of finished astrakhan skins tanned with aldehydes at a moisture content of 14%

№	Index	Aldehyde consumption, g / l					
		Formaldehyde			Glutaraldehyde		
		1	3	5	1	3	5
1.	Strength limit when stretched, MPa	1,0	1,3	1,2	1,3	1,6	1,4
2.	Stress when cracks appear in the face layer, MPa	0,326	0,341	0,337	0,348	0,365	0,354
3.	Elongation at stress 4,9 MPa, %	19,0	18,3	18,7	16,5	17,3	17,8
4.	Resistance to repeated bending: revolutions, min^{-1}	3956	4723	4117	4872	5216	5032
5.	Average thickness, mm	1,3	1,3	1,4	1,4	1,6	1,6
6.	Grindability, kg/m^2	0,037	0,047	0,043	0,053	0,067	0,058
7.	Chromium oxide, %	3,1	3,5	3,8	3,6	3,8	4,1
8.	Hydrothermal destruction, ^oC	74	83	86	78	80	82

The results obtained allow us to conclude that the physical, mechanical and chemical indicators of the experimental and control karakul skins are within the limits of the state standard.

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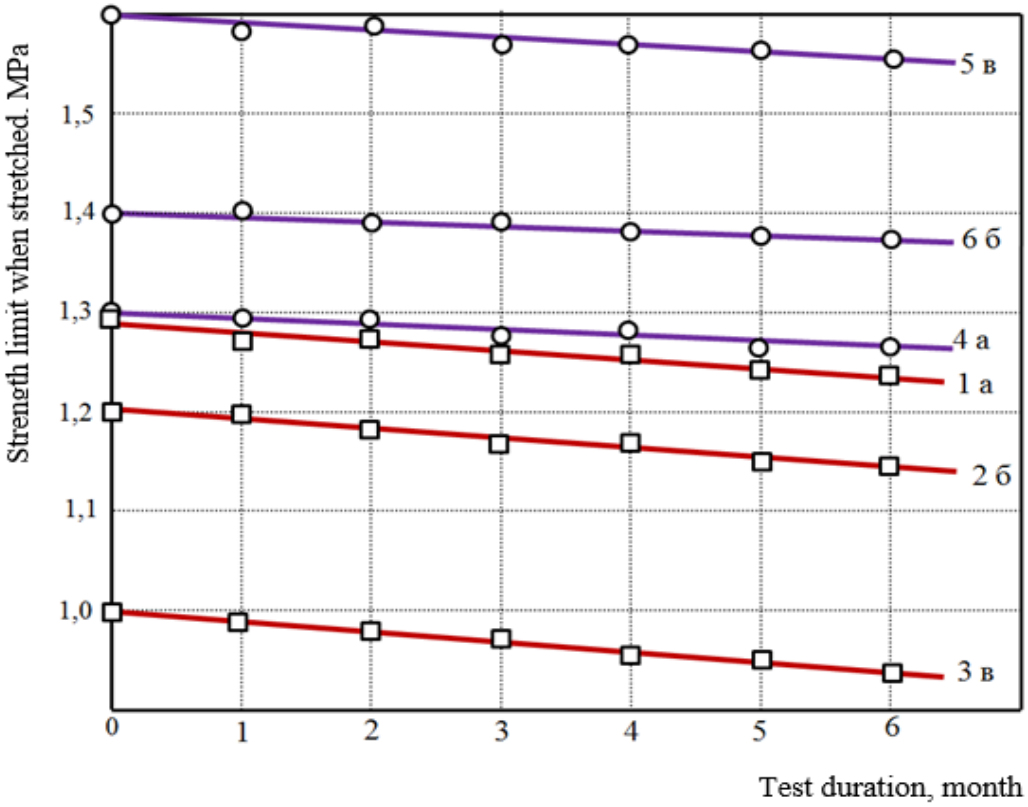

Fig. 1 Dependences of the tensile strength (1-6) of karakul skins over time on the consumption of formaldehyde (1-3) and glutaraldehyde (4-6), g / l: a-1, b-3 and c-5.

It was also of interest to change the strength properties of kakul skins tanned with acrylic aldehyde over time. Samples of karakul skins immediately after production, and then every 30 days for 6 months.

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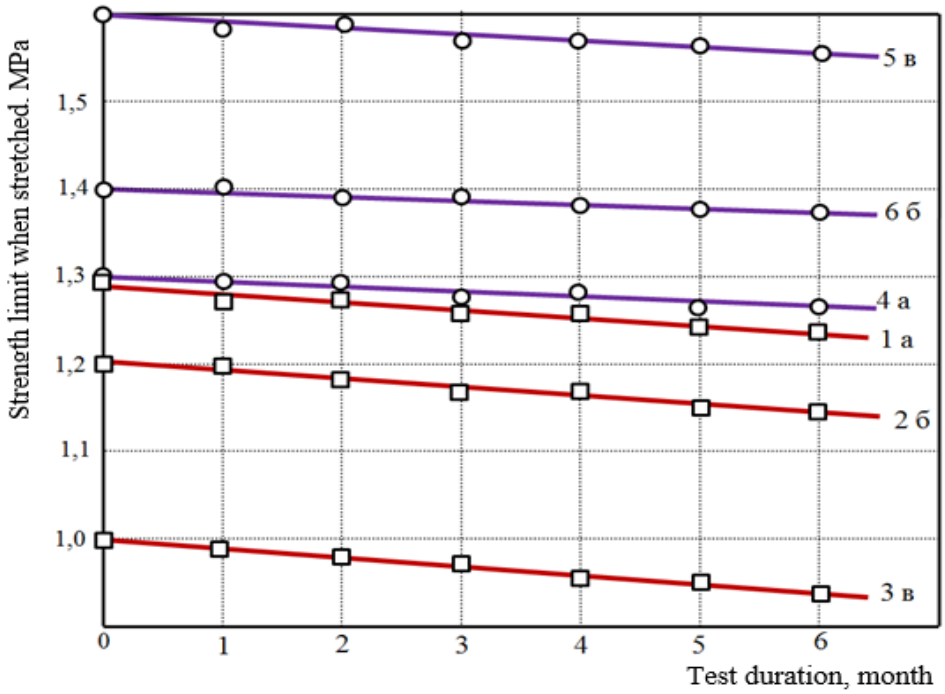

Fig. 2 Dependences of the tensile strength (1-6) of astrakhan skins over time on the consumption of formaldehyde (1-3) and glutaraldehyde (4-6),g / l: a-1, b-3 and c-5.

The test results are shown in Figs 1 and 2.

The data obtained showed that the strength properties of the studied karakul skins practically did not change during half a year.

IV CONCLUSIONS

Thus, the studies carried out indicate good technological properties of aldehydes and the possibility of partial replacement of chrome tanning agent for the production of karakul fur.

REFERENCES

1. Kodirov T.J., Kazakov F.F. ToshevA.Yu. Synthesis of aminoaldehyde oligomers and leather filling technology // Monograph. Under the general ed. T.J. Kodirova. MVISSO RUz, Tashkent Institute of Textile and Light Industry.-Tashkent: Fan.-2016 - 304 P
2. Kazakov F.F., Kodirov T.J. Tanning of karakul skins modified by carboamid of formaldehyde resin // European Sciences review. - Austria. – 2017 y. (Juli - August) № 7-8. -P. 100-103.
3. Chemical encyclopedic dictionary / Ch. ed. Knunyants I.L. - M.: Soviet Encyclopedia, 1983. - P. 139. - 792
4. Karakulcha // Modern explanatory dictionary of the Russian language: in 3 volumes / ed.-comp. T.F. Efremova. - AST: Astrel: Harvest, 2006. - T. 1: A — L.
5. Golovteeva A.A., Kutsidi D.A., Sankin. L. B. Laboratory workshop on chemistry and technology of leather and fur, M.:, Legprombytizdat, 1987, p. 311
6. Test methods for chrome leathers for shoe uppers. - M.: TSNIITEI legprom, 1972 .- 38-48 pp.