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Investigation of the Influence of the Type And Content of Reactive Water-Soluble Polymers in the Composition on the Process of Skin Finishing and their Structural Changes

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ABSTRACT: This article examines the influence of the type and content of modified polyacrylonitrile in the composition on the process of skin finishing and their structural changes. The compositions of pigmented soils containing hydrolyzed polymers under various conditions were determined, as well as the nature of structural changes in the dermis during the distribution of polymer compositions during skin priming.

KEYWORDS: polymer composition, chrome leather, hydrolyzed polyacrylonitrile, leather priming.

I. INTRODUCTION

In order to improve the management of the leather and footwear industry in Uzbekistan, deepen market relations, and increase the output of competitive products.

When processing leather in technological processes, compositions consisting of a mixture of various inorganic and organic substances are used [1]. In our country, the main demand for components of compositions is met by imports, which is associated with the expenditure of foreign currency, for our enterprises and other complications.

II. THE MAIN FINDINGS AND RESULTS

At present, economic issues also play an important role in the successful development of the national economy of the sovereign Republic of Uzbekistan: replacing imported raw materials with local components.
In this regard, it is necessary to introduce widely available local synthetic preparations with new qualities for the composition of the composition for tanning and finishing leather.

Water dispersions of polymers are mainly used to improve the properties of chrome-tanned leather, in particular to give them water resistance, increase resistance to evaporation, and align the thickness of topographic areas.

The study of the nature of structural changes in the dermis during the distribution of polymer compositions during skin priming is of great interest. The study was performed on samples from the cheprachnoy part of chrome-tanned leather developed by the method, completed by the method of assimmetric fringe [2].

The soil was applied once. The soil consumption was 65 g/m2. Table 1 shows the composition of pigmented soils containing various grades of hydrolyzed polyacrylonitrile (HYPAN, K-4).

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We conducted studies have established the optimal ratio of different brands HYPANa.

Table 1
Composition of pigmented soil in the mass.h

Components	Options					
	1 control	2	3	4	5	6
Black pigment concentrate - on nigrosin	80	80	80	80	80	80
- onsoot	20	20	20	20	20	20
10% casein	50	-	-	-	-	-
Shellac 10%	50	-	-	-	-	-
Water-solublepolymer K-4	-	10	30	40	70	100
Water-soluble polymer Na-CMC	-	5	10	15	20	25
20% waxemulsion	10	10	10	10	10	10
Acrylicemulsion MBM-3 20%	100	100	100	100	100	100
Dispersion MX-30 20%	100	100	100	60	70	100
Latex DMMA-65 – GP	100	100	10	100	90	80
Water	160	160	160	160	160	160

After processing the skins with various options, they were left to lie down for 8 hours at room temperature. Pressing was carried out at a temperature of 363 K and a plate pressure of 15 MPa with an exposure time of 5 seconds.

The control I-version of the composition was made based on the known recipe. The water resistance of leather was determined by indicators of water resistance under dynamic conditions (on the PVD-2 device) and two-hour wetness [3].
The two-hour wetness of skin samples during repeated testing in the drying-bedsore-wetting cycle was determined for 6 cycles. For all skin samples, there is a decrease in the two-hour wetness index during the first, second and third cycles, and then the indicator remained almost unchanged.

Physical and mechanical properties of chrome-tanned leather are shown in table 2. Experiments have shown that to improve the physical and mechanical properties of leather for pigmented soil, it is advisable to use modified HYPANE in various conditions.

Table 2 shows that the use of various polymers instead of casein and shellac improves the physical and mechanical properties of the skin. These experimental data show that an increase in the number of polymers used in the composition gives a good filling capacity, high tensile resistance and uniform color on the skin surface. V and VI variants of the composition are optimal.

Table 2
Physical and mechanical parameters of experimental skins.

Name indicators		Options						GOST 938
		I control	II	III	IV	V	VI	
Water resistance under dynamic conditions, min.	After 1 day.	42	19	26	31	39	43	N/a * 60
	After 2 days.	48	28	32	36	41	47	
	After 3 days.	55	32	38	42	48	50	
The limit of the tensile strength 9.8 MPa		2,7	2,4	2,5	2,5	2,7	2,8	N/m * 1,5
Elongationatbreak,%		29	23	24	25	27	28	20-40

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Water vapor permeability, mg/(cm2. h)	6,2	5,9	5,9	6,0	6,1	6,1	N/m * 4,0

Note: N/m* - not less than
N/a* - no more than

The skin surface structure was studied by electron microscopic method.

To prepare objects of scanning electron microscopy EM-7 at an accelerating voltage of 200 kV, the method of metal (chromium) deposition with a layer thickness of 300 A0 was applied.

The study of the distribution of the soil polymer over the skin layers showed that mainly reactive water-soluble polymers are deposited in the upper layers of the dermis. An increase in the content of water-soluble polymers K-4 in the composition of soils increases the penetration depth of other film-forming agents, however, its content in the lower layers of the skin is insignificant.

The deposition of polymers mainly in the uppermost layer of the dermis with insufficient content of hydrolyzed polyacrylonitrile and polyacrylamide in the soil can lead to a sharp increase in the rigidity of the facial layer and even the airiness of finished skins.

Therefore, the VI-variant of the composition was considered optimal, where the distribution of the bulk of the polymer composition in the skin layers will allow to equalize the stiffness of the dermis in thickness.
As the results of microscopic studies have shown, after priming, the fibrous structure of the dermis is compacted. In this case, the polymer composition binds the collagen fibers of the papillary and reticular layers in such a way that their position relative to each other is firmly fixed in the drawings. 1. a, d, ande.

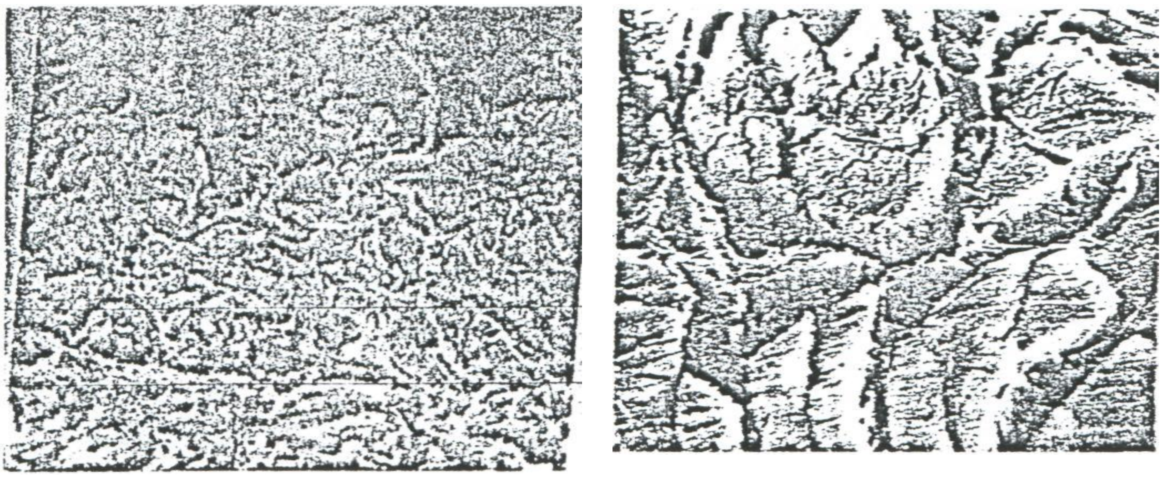

Fig. 1 a. Micrograph of the structure of skin samples treated with various polymer compositions. Options: a - I option, b - II option

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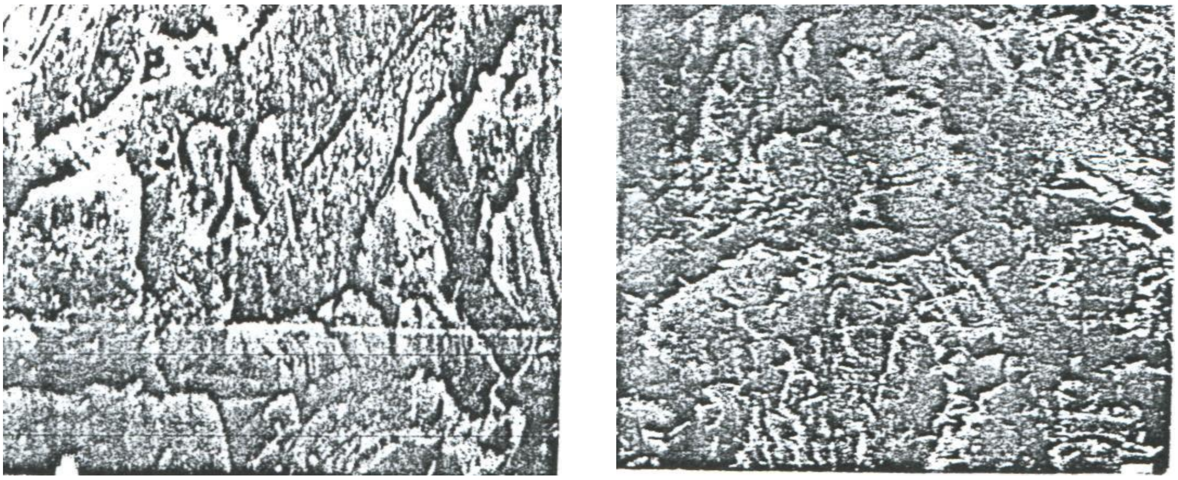

Fig.1. Micrograph of the structure of skin samples treated with various polymer compositions. Options: b - III optionand d - IY option.

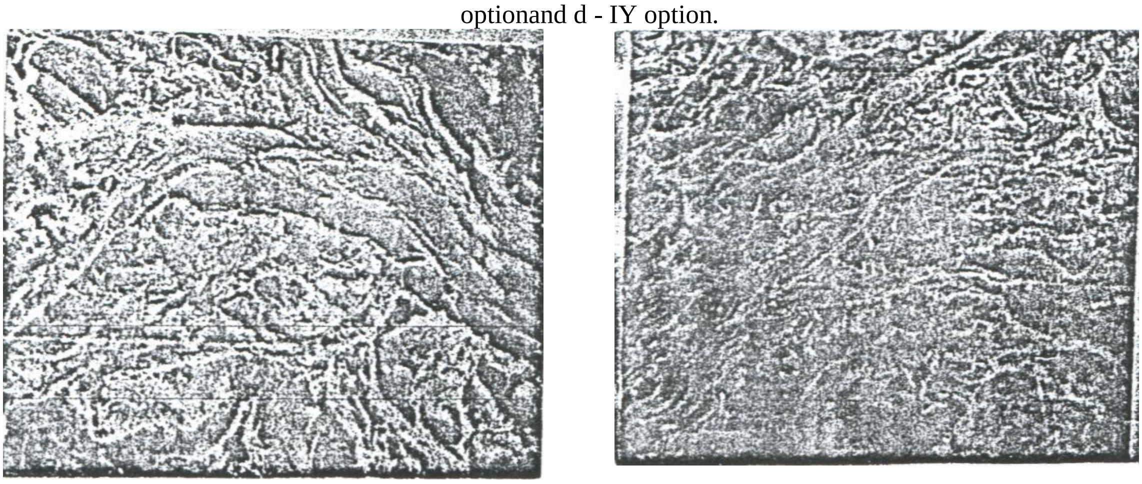

Fig.1E. Micrograph of the structure of skin samples treated with various polymer compositions. Options: d - Voptionand e - VIoption.

The distribution pattern of the impregnating and preliminary primers, including hydrolyzed polyacrylonitriles of various brands, does not differ significantly from the distribution in the skin containing shellac and casein.

In both cases, the polymer composition of the soil, partially enveloping individual collagen fibers, is mainly deposited in the skin as agglomerates, forming fixed bundles of fibers. Moreover, the soil being deposited in small and partially in medium-sized pores, it does not reduce the hygienic properties of the treated skin, slightly increasing its rigidity.

This distribution of the polymer composition of the soil in the skin helps to equalize the stiffness of the reticular and papillary layers of the dermis, increase the elastic modulus of the latter, which leads to a decrease in the physical and mechanical characteristics of primed skins.

III. CONCLUSION

Based on the conducted research, it can be concluded that new compositions containing a water-soluble polymer K-4 have high surface properties that allow you to regulate the wetting ability of the soil, contribute to the optimal distribution of film-forming agents in the dermis, which significantly affects the elastic and hygienic properties of finished skins.

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REFERENCES

[1]. I. P. Strakhov et al. "Leather finishing", M., Light and food industry, 1983, 359p.

[2]. A. S. 1595914. Method skin treatment / E. A. Savina, D. A. Kutigi, N. To. Baremboim of MTILP // Opening. Inventions, 1990, No. 36

[3]. M. I. Temirova "Development of effective compositions based on local and secondary raw materials and technologies for their production for tanning and finishing leather " abstract. Dis. ...Cand, tech. sciences'. Tashkent, 2000.- p. 132.