ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

# Studying the nature influence Film-Forming on the Quality of Final Finish of the Cotton Fabric

**SaydaliyevaNodiraZiyavitdinovna, KhudayberdiyevaDilfuzaBahramovna, SuyunovJamshidBaxtiyoro'gli, SultoniyozovXusanUlug'beko'gli**

**ABSTRACT**: The purpose of the given work is to study the influence of the nature film-forming on quality of final finish of cotton fabrics. As film-forming is chosen the polyvinyl acetate and size on the basis of preparation К-4.

**KEYWORDS:** film-forming, connecting, the catalyst, final furnish, little shrinkage, air permeability, quality, a total corner of disclosing, rigidity of fabric.

## I.INTRODUCTION

With the aim to impart stable anti-shrink properties, fullness, quality factor, softness, and silkiness to cotton fabrics, traditionally is envisaged the usage of thermosetting resins, film-forming preparations, catalysts, softeners, and other textile auxiliary substances.However, due to toughen of environmental requirements for the formaldehyde content in fabrics, precondensates are not practically used. Imported drugs that meet all the necessary requirements are expensive and inaccessible for manufacturers of household fabrics [1-3].

Currently, for linen assortment fabricsare used emulsions and latexes of film-forming preparations based on polyvinyl acetate, polyethylene emulsion, and for orleanspurpose are used, general and special types of finishes withapplying of foreign polymer preparations.All these preparations belong to acrylic copolymers, in the structure of which there are such monomers as butyl acrylate, acrylic acid esters, which lead to the production of soft and elastic textile materials [4-6].

Acrylic and derivatives of water-soluble acrylic compounds are widely used as textile finishing preparations. Derivatives of acrylic compounds thanks to presence of double bond and due to functional groups are able to interact with groups of fibrous material macromolecules on the account of adhesive forces, as well as polymerize, forming flexible polymer structures.Polyacrylonitrile latex in combination with cross-linking components is used as the size for veneering low-shrink properties to cotton fabrics. The saponified product of polyacrylonitrile is used as the size agent and the sizing composition component [7-8].

Worked out technologies of anti-shrink and low crease finish at using compositions contained thermosetting of resin precondensate and acrylic polymer [5].It is shown that the usage of the aqueous dispersion based on vinyl acetate, modified acrylic acid in the finished composition allows to achieve positive finishing results at low concentration of thermosetting resins precondensates. The decreasing of concentration of thermosetting resins precondensates from 200 to 25 g / l contributes to obtain the required crushability indicators, GOST-17504-80, heat treatment temperature up to 120 ° C and loss of tensile strength of the fabric by 10-15%.

Introduction, in the composition of finished compositions, additionally emulsions of thermoplastic resins is capable to impart a fiber filled with a hard or soft neck, such as acrylic copolymers, in the structure of which are presented such monomers as butyl acrylate, esters of acrylic acid, determine the production of soft and elastic textile materials. At the same time, the presence of vinyl acetate fragments, styrene and methyl methacrylate in the acrylic polymer increases the stiffness of the fabric [9].

The criteria of the targeted selection of film-forming polymers for their usage in the modification of textile materials for various functional purposes are indicators that determine the stability of the fabric`s finish to the exploitation conditions and washings, water absorption of modified materials, increasing physicomechanical properties that make possible to choose polymers that are technologically acceptable for applying them in textile production and neck`s stiffness of the modified fabrics [10].

In previous researches, the authors proposed a new composition for final finishing of cotton fabrics [11-12].

The aim of this work is to study the nature influence film-forming on the quality of final finishing of the cotton fabric.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 10 , October 2019

## II. OBJECTS AND METHODS OF THE RESEARCH

For the research, the selected fabriccalico was made from natural cotton. The physicochemical and exploitation properties of the initial and sizing fabrics were studied at the accredited Training and Certification Center, functioned in TITLI, using the following devices: AUTOGRAPH AGS-H, PT-2 flexible meter, MONSANT AW - 6, AR-360SM Frazie .tye Air Permeabiliti Tester "in accordance with the approved standards: GOST 6611.2-73, GOST 13711-82, GOST 7138-73, GOST 10550 - 75, GOST 19204-73, GOST 12088-77.

## III. THE OBTAINED RESULTS AND THEIR DISCUSSION

The final finishing of the cotton fabric with the composition based on the K-4 preparation increases the values of the RMS by 22-42 degrees and the formation of a gain on the fabric up to 7.8%. The sizing process does not affect negatively to the stiffness of the tissue, while the elasticity of the tissue is maintained, at the same time improves capillarity. The size`s low washability (0.24%) contained K-4, indicates the bond strength of the polymer film on the surface of the fabric.

The study of each component role of the proposed composition is shown that in the absence of the K-4 preparation, a film is formed on the surface of the tissue, while the gain is 4.5%, however, the wash-off of the sizing is high (4.2%). A similar phenomenon is observed in the absence of the catalyst in the size composition.

The absence of PVA in the size composition reduces the gain formation, the washability of such a film remains high. Qualitative indicators of finished fabric, such as total opening coal, shrinkage, are getting a bit worse. The size of medium has a pH of 9 ± 0.5; the increasing in the alkalinity of the medium is necessary to create favorable environment for formation of intermolecular bond. Without additional increasing in the alkalinity of the medium, the quality of the finish improves, however, the strength is decreased and the fabric stiffness is increased.

The quality of the final finish largely depends on the bond`s strength of the formed polymer film on the fabric surface, therefore the binder in the size composition significantly affects of the finish the quality. Further, itwas studied the influence of the binder content on the finish quality (Fig. 1). With an increasing in the content of the K-4 preparation as part of the size, the tissue gain is increased. There is increasing in physical and mechanical properties, RMS and the decrease in shrinkage by 3-4 times. However, the content of the K-4 preparation in the formulation of more than 100 g / l leads to decreasing in these indicators. According to the results of the experiment, the amount of K-4 content in the sizing composition of 75 g / l was selected.

Improving the quality characteristics of cotton fabrics at the influence of composition containing K-4, the low washability of the size allows us to assume that along with the filling of pores and film formation on the fibers surface, this drug chemically interacts with cellulose. This is facilitated by the presence of a catalyst in the size, high temperature treatment and the alkaline environment.

The sizing medium compound has a pH of 9 ± 0.5; increasing of alkalinity inthe medium is necessary for creation favorable environment in forming of intermolecular bonds. In this regard, it is studied the effect of pH on the quality of the finish. Without additional increasing in the alkalinity of the medium, the quality of the finish is improved, however, the strength is decreased and the stiffness of the fabric is increased (Table 1).

For evaluation the quality of the finish, it is compared the properties of samples processed by the proposed composition and known compositions based on carbamol CEM and the preparation K-4 with different film-forming nature. The results are shown in table.2.

The total opening angle of cotton fabric treated with composition containing CEM carbamol increases and shrinkage decreases by 2–3 times. Processing at the same time increases the rigidity of the tissue, reduces capillarity and worsens the appearance of the tissue. It is known that textile materials sizing with the carbamol CEM preparation in the process of exploitation emits formaldehyde. Therefore, the usage of these drugs is currently limited.

The composition based on the K-4 preparation and film-forming PVA increases the values of the RMS to 50 degrees, the gain is 12%. The low sizewashability containing K-4 indicates the bond strength of the polymer film on the fabric surface. The sizing process does not affect negatively the stiffness of the fabric, while the elasticity and crepe effect of the fabric are preserved, as well as the capillarity is improved.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

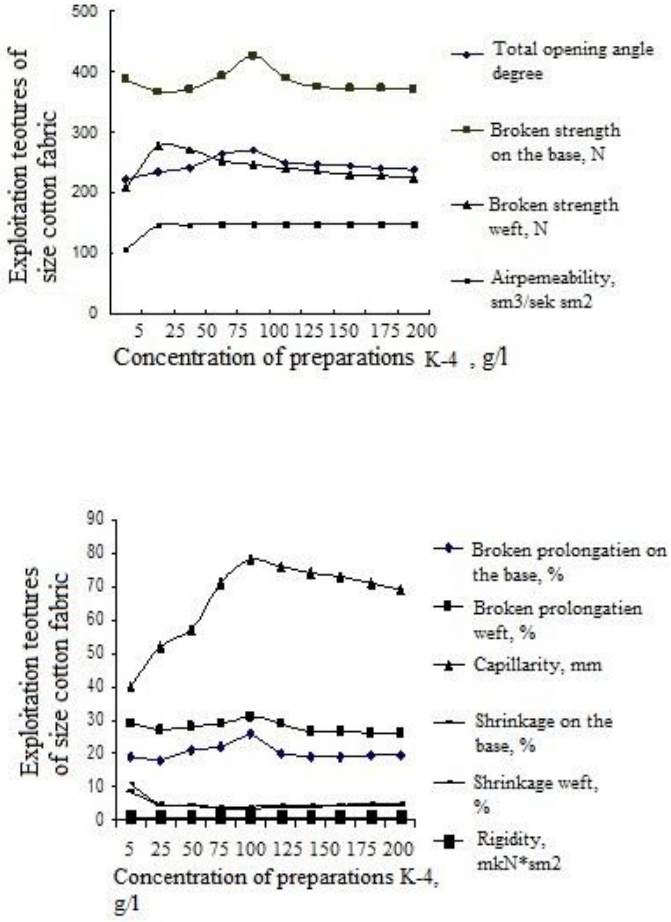


Fig. 1 Influence of the drug concentration K-4 on the operational properties of the finished cotton fabric

Table 1

The influence of the pH of the sizing medium on the quality of the finish of cotton fabric

| | The composition of the size, g / l | Weigh tgain, % | Washoffb ridge, % | Shrinkage,% | | Total opening angle, a$^o$ | BreakingStrength, N | |
|---|---|---|---|---|---|---|---|---|
| | | | | thebasis | weft | | thebasis | weft |
| 1 | Sourcetissue | - | - | 8,4 | 11,7 | 83 | 224 | 216 |
| 2 | K-4 –75; PVA-35; $NaH_2PO_4$-10 pH = 9 | 7,8 | 0,24 | - | - | 125 | 302 | 202 |
| 3 | pH = 10 | 8,0 | 1,1 | 3.3 | 4.3 | 107 | 322 | 284 |
| 4 | pH = 11 | 8,5 | 1.4 | 4,2 | 4,8 | 110 | 319 | 307 |

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 10 , October 2019

Table 2

The influence of size composition on the quality of the finish of crepe “de Chine fabric”

| № | The composition of the sizing, g / l | Weight gain,% | Wash off bridge % | Shrinkage, % | | Total opening angle, a$^o$ | Elongation, % | | Breaking Strength, N | | Air penetrate cm$^3$ / sec ·cm$^2$ | Rigidity μN· cm$^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | The basis | weft | | The basis | weft | The basis | weft | | |
| 1 | Sourcetissue | | - | 8,4 | 11,7 | 83 | 20 | 16 | 224 | 216 | 65,4 | 3952,1 |
| 2 | Carbamol CEM -100 PVA-25 $NH_4CI$-20 | 12,30 | 1,05 | 3,4 | 4,5 | 185 | 22 | 31 | 324 | 218 | 36,3 | 5245,3 |
| 3 | K-4 –75 PVA-35 $NaH_2PO_4$-10 pH = 10 | 7,8 | - | - | - | 125 | 17 | 16 | 302 | 202 | 48,0 | 6524,3 |
| 4 | K-4 – 75 PVC-20 $NaH_2PO_4$-10 pH = 10 | 6,0 | 1,1 | 3.8 | 4.3 | 110 | 17 | 16 | 285 | 243 | 49,0 | 4268,5 |

## IV. SUMMARY

It is studied the influence of the size composition on the quality of finishing of cotton fabrics was studied. As a film-forming agent, it was chosen PVA and composition based on the K-4 preparation.

Changing the amount of the binder K-4 in the size composition also contributes to increase in the RMS from 16 to 42 degrees, strength properties by an average of 22%.

For comparing the effect of the composition on the quality of the finish fabric was chosen on the base of a carbamol CEM, traditionally used for cotton fabrics. At processing the fabric with a composition containing CEM carbamol, the total opening angle is increased and shrinkage is decrease din 2–3 times. Processing at the same time increases the rigidity of the fabric but worsens the appearance of the fabric. It is known that textile materials sized with the carbamol CEM preparation emit formaldehyde in the process of exploitation. Thus it is shown the effectiveness of the usage of PVA as a film-forming polymer in technologies for imparting non-shrink and low crush properties to cotton fabrics. Moreover, the concentration of binder and film-forming can be reduced, which helps to improve the operational properties of tissues.

## REFERENCES

1. HellwichHartmut, MohringUwe. Obtaining shrink-resistant narrow cotton fabrics. // Flechting. − Germany. 2005. 42.− No. 1.− P. 4−6,
2. UK patent. No. 2217741. Processing silk fabrics. Publication date 11/11/2001. According to RZH "ISM". issue 70. M. 1990− No. 9. −C.17
3. Sharma P. and Gahlot M. Application of wrinkle resistant finish on silk fabric audits durability // Asian Textile Journal 2002. 1 1. − No. 12. − P. 68−70.
4. Finishing cotton fabrics: Handbook / Edited by B.N. Melnikov. - Ivanovo: publishing house "Talka", 2003. - 484 p. ISBN 5-87596-051-5, p. 369
5. Patent 2480548 of the Russian Federation. Formaldehyde-free composition for the final finishing of cellulose-containing textile materials :. A.S. Zakharchenko, O.V. Kozlova. Posted: 04/27/2013 Bull. Number 12
6. RF patent 2374370. Formaldehyde-free composition for imparting low-crushability properties to cellulose-containing textile materials (published on 11.27.09).

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

7. Mikhailov M.P. Investigation of the process of saponification of acrylonitrile copolymer in order to obtain water-soluble sizing preparations. Author's abstract ... cand. Tech. Science. M .: MTI. 1973 .- 21 p.
8. Shirokova M.K. the use of acryloamide and its derivatives to give the cotton fabric a crush-resistant property. Dis. ... cand. Tech. Science. Ivanovo .: ITI. 1974.-132 p.
9. Melenchuk, E.V. and other Domestic polymers in dyeing and final finishing of technical fabrics. In Sat thesis. doc. Int. scientific and practical. seminar SMARTEX-2011, IGTA, Ivanovo, 2011.-S.72-74.
10. Zakharchenko, A.S. Studying the properties of film-forming polymers used in the decoration of textile materials / A.S. Zakharchenko, A.A. Aleshina, O.V. Kozlova // Izv. universities. “Chemistry and chemical technology” - 2012. - V. 55 No. 3 - P. 87-91.
11. Khudayberdiyeva D.B, Formaldehyde-free composition for the final finishing of fabrics based on natural silk // Textile Industry 2008, No. 8.- S.43-47
12. D. Khudayberdiyeva, M. Abdukarimova, M. Mirzahmedova, S. Ahmedov. IR- spectroscopic studies of natural silk and products of its interaction with the components of the dressing composition. Chemistry of Natural Compounds. 2010 ISSUE 4. −V. 46, −P. 604.