Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 4, December, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

STUDY OF THICKENING POLYMER COMPOSITIONS FOR FABRIC STUFFING

Eshdavlatova Gulrukh Eshmamatovna
Associate Professor of the Department of General Chemistry of the Karshi Institute of Engineering and Economics
eshdavlatovagulrux@gmail.com

Annotation: Thickening compositions of a new composition have been developed for printing blended fabrics based on cotton and nitron fibers. The effect of the components of the extinguishing compositions on the rheological properties of the composition depending on their concentration has been studied. **The development of a new composition of the thickening composition, its physicochemical and rheological properties has been established.**
Keywords: Thickener, dye, composition, fabric printing, blended fabrics, polyacrylamide, oxidized starch, color fastness, composition, concentration.

Introduction

For printing blended fabrics, it should be noted that, especially natural and synthetic (cotton and nitron) fibers with active dyes, the issue of choosing a thickener is important. Because most of the traditional thickeners by nature and chemical structure belong to high-molecular hydroxyl containing compounds, i.e. polysaccharides, which are close in chemical structure to cellulose. Based on production experiments, alginic acid salts, i.e. sodium alginate and synthetic thickeners [1], have the highest positive properties.

During the processing of cotton fiber into yarn, it is subjected to a number of mechanical stresses that lead to the deterioration of its properties. Therefore, the cotton fiber is refined and the fabric based on it is printed with the help of various ingredients after the stage of boiling and bleaching.

As you know, in order to create a colorful pattern on fabric with the existing technology, it is necessary to place the dye in a viscous system that is able to ensure its transition from a recessed engraving or template grid to the fabric. The viscous system is the thickener. Thickeners are polymer solutions, multicomponent, highly structured disperse systems.

Despite these requirements, they are not ideal. These thickeners do not meet the requirements in production mainly for two reasons: their high cost and sensitivity to hardness salts and pH.

There are such thickeners Solvitosa S-5, Emprint, manutex, etc., due to their high cost, which makes it difficult to use them on a large scale in production. Therefore, the use of domestic products based on oxidized starch, PAA and K-4 as thickeners when printing mixed fabrics with active dyes is interesting as an alternative to expensive imported thickeners. Therefore, there was a need to study the effect of the new composition of thickening compositions on the

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 4, December, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

printing properties of blended cotton and nitron fabrics. Oxidized starch, polyacrylamide and K-4 were chosen as thickening compositions [2].

Literature And Methodology

When printing mixed textile materials with active dyes at domestic textile enterprises, starch should not be used as a thickener. Because when printing with starch hydrogels, low values of dye fixation degrees are obtained as a result of chemical binding of the dye by a thickener, i.e. with starch, and, as a result, the formation of hard-to-remove films, which greatly complicates the technological process of washing printed fabrics.

It is this circumstance that contributes to ensuring the color resistance to physical and chemical treatments. In addition, as a result of printing, the active dye becomes part of the fiber macromolecule, as a result of which the dye fixation increases, leading to high resistance to wet treatments, friction, color intensity and other external influences [3].

Despite significant achievements in the field of cotton fiber refinement, the successes in this area are far from exhausted, so the development of effective water-soluble compositions based on local raw materials, suitable as a thickener in the printing process of blended fabrics based on cotton and nitron fibers, is a very urgent task.

Outcomes

When printing samples of blended fabrics based on cotton and nitron fibers at a ratio of 70:30, respectively, the following active dyes were selected. These dyes are called bright red 5CX, remazole bright blue P, orange 2KT. It should be noted that the choice of dyes is due to the fact that the above-mentioned active dyes are widely used for printing many fabrics, such as cotton, viscose and other blended fibers, give a durable high-quality color, resistant to the physical and chemical effects of printed patterns using the proposed thickener [4].

The influence of the components of silencing compositions on the rheological properties of the composition depending on their concentration has been studied. The obtained data are given in Table 1.

From the data obtained (Table 1) it can be seen that with an increase in the amount **of PAA in the composition of oxidized starch, its viscosity, the degree of thixotropic reduction, and the yield strength change significantly.**

Table 1

Changes in rheological properties of thickening compositions depending on the concentration of OC

Oxidized starch, %	ПАА (from vesa krakhmala, %)	Degree of thixotropic recovery, %	Yield strength, Rm, g/cm2
5	0,5	81,6	54,76
5	1,0	83,4	51,48

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 4, December, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

5	**1,5**	**84,7**	**50,72**
5	**2,0**	**86,3**	**43,65**
6	**0,5**	**83,6**	**49,74**
6	**1,0**	**85,9**	**46,37**
6	**1,5**	**88,7**	**41,28**
6	**2,0**	**89,6**	**34,63**
7	**0,5**	**87,8**	**43,82**
7	**1,0**	**91,2**	**40,64**
7	**1,5**	**93,4**	**32,25**
7	**2,0**	**97,6**	**27,41**

As can be seen from the table, as a result of the development of a new composition of the thickening composition, its physicochemical and rheological properties in relation to thickeners containing starch, carboxymethyl starch and Na-CMC become high. And in relation to the thickeners of sodium alginate and solvitose, the rheological properties of the developed composition become close. When 6.0% oxidized starch is added to the solution, the solution has a higher viscosity, rheological properties change, and the thixotropic reduction rate is 85.9% and the yield strength is 46.37 g/cm2.

In this regard, it was of interest to develop a technology for a new composition of thickening compositions for printing blended fabrics based on cotton and nitron fibers. From the data shown in Fig. As can be seen from Figure 1, the introduction of 6.0% oxidized starch, 1% PAA and 1.5% K-4 (relative to the weight of the total solution) into the composition of the finished product makes it possible to obtain a more viscous printing ink than without the additive.

Discussion

The reason for the high viscosity, in our opinion, is the additional formation of supramolecular structures with the help of hydrogen and intermolecular bonds between the functional groups OC, PAA and K-4. Each type of bond contributes to increasing the stability of the oxidized starch paste structure [5].

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 4, December, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

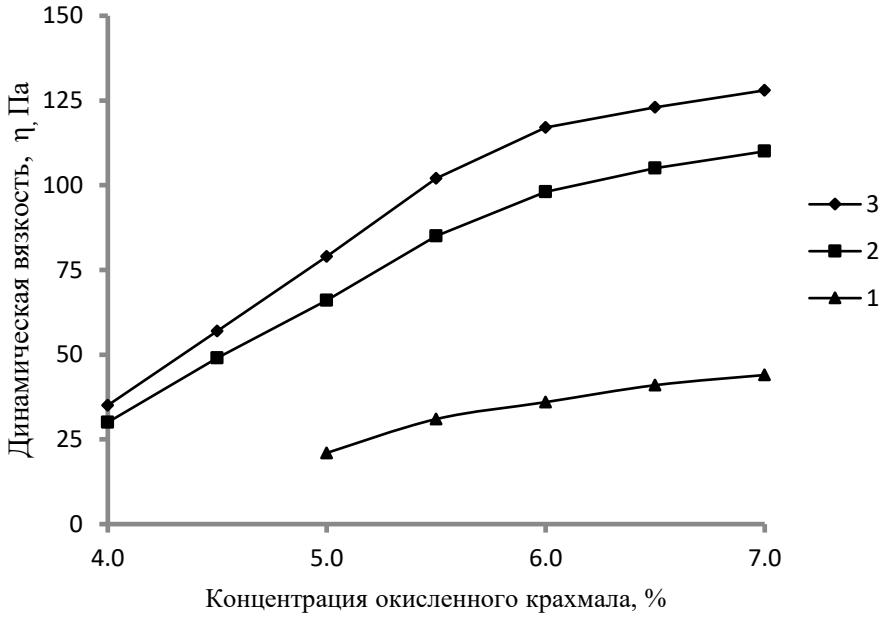

Fig.1. Influence of polymer additives on the dynamic viscosity of oxidized starch of the resulting printed compositions.
1 – no additives; 2 – 1.0 % PAA; 3 – 1.0% PAA-1.5% K-4

The revealed feature of the behavior of the developed thickening compound is very important for achieving the necessary viscosity during the operation of the printing press. At the same time, in this case, the amount of thickening introduced into the composition of the printing ink can be reduced by 15-17% with the addition of oxidized starch, 1.0% PAA and 1.5% K-4. A preliminary economic calculation of the production of printing inks based on 6% oxidized starch and composite (obtained by the "hot" method) thickener showed that the introduction of 1.0% PAA and 1.5% K-4 in the oxidized starch paste as a whole allows to reduce production costs during the preparation of the thickener.

In order to assess the degree of destruction of internal structures under printing conditions and to analyze the changes in these structures during the introduction of thickener components, rheological parameters were determined for the studied compositions of various compositions. Analyzing the scientific and technical literature, it has been established that there are some drawbacks in the printing of cotton fabrics with active dyes due to the lack of a wide range of thickeners that could meet all the necessary requirements for high-quality pattern patterns obtained on textile material. In this regard, it was of interest to study and substantiate the possibility of using water-soluble compositions based on oxidized starch (OC) and polyacrylamide (PAA) and K-4 as a thickener when stuffed with active dyes, as well as to expand the range of thickeners through the use of these promising types of polymers [6].

Western European Journal of Modern Experiments and Scientific Methods
Volume 1, Issue 4, December, 2023
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

Conclusion

The experiments have shown that the components of the thickening polymer compositions are compatible with the selected active dyes. To determine the effect of the components of thickening compositions on the quality and color fastness, the printing quality parameters were evaluated: color saturation, the degree of dye fixation, resistance to wet and mechanical treatments - resistance to washing, sweat and friction according to generally accepted methods

References

1. H.Ismoilova, O.Rakhimov, N.Turabaeva, G.Eshdavlatova. Irrigation regime of fine fiber cotton in the karshin steppe. Conference Committee. Indexed in leading databases – Scopus, Web of Science, and Inspec. *Scopus & Web of Science indexed*.
2. Esdavlatova G.E. (2022). Oxidized starch, polyacrylamide va K-4 asocida gul released matolarning rheologic va coloristic hossalaries. *Composites magazine*. Toshkent. Pages No. 4, 66-68.
3. G.E.Eshdavlatova and A.X.Panjiyev. (2023). Study of thickening polymeric compositions for printing fabric of blended fibers // E3S Web of Conferences 402, 14032. TransSiberia 2023 . https://doi.org/10.1051/e3sconf/202340214032.
4. H.D.Ismoilova, G.E.Eshdavlatova // The influence of irrigation regimes on cotton productivity // BIO Web of Conferen ces 71, 01097 (2 023) CIBTA-II-2023. https://doi.org/10.1051/bioconf/20237101097.
5. Eshdavlatova, G.E., Amonov, M.R. (2021). Evaluation of the effect of the components of thickening compositions on the results of printing of mixed fabrics with active dyes. *Journal of Development of Science and Technology*. No. 5. P. 54-58.
6. Eshdavlatova, G.E., Amonov, M.R. (2021). Study of rheological properties of thickening compositions for printing fabric based on mixed fibers. *Universium: Technical Sciences*. № 11 (89). Part 2. P.19-23.
7. Bocharov, S.S., Rakhimova, Z.O., Minaev, V.E. (1996). Bentonite-based textile printing thickeners. Sat. Second Congress of Textile Chemists and Colorists. Ivanovo. September 17-19, p. 65.
8. Eshdavlatova, G.E., Amonov, M.R. (2022). Rheological Properties of Thickening Polymer Composition and Printing Inks Based on Them. *Development of Science and Technology:* Scientific and Technical Journal. No 3. P. 27-31.
9. Эшдавлатова Г.Э. EURASIAN JOURNAL OF ACADEMIC RESEARCH. Innovative Academy Research Support Center. UIF = 8.1 | SJIF = 5.685. www.in-academy.uzю 147-152 с.
10. Эшдавлатова Г.Э. Progress Annals: Journal of Progressive Research. Volume 1, Issue 7, November, 2023. ISSN (E): 2810-6466. Website: https://academiaone.org/index.php/8. 14-16.
11. Эшдавлатова Г.Э. Open Academia: Journal of Scholarly Research. Volume 1, Issue 8, November, 2023. ISSN (E): 2810-6377. Website: https://academiaone.org/index.php/4