

**Impact Factor:**

<b>ISRA</b> (India) = <b>6.317</b>	<b>SIS</b> (USA) = <b>0.912</b>	<b>ICV</b> (Poland) = <b>6.630</b>
<b>ISI</b> (Dubai, UAE) = <b>1.582</b>	<b>PIIHQ</b> (Russia) = <b>3.939</b>	<b>PIF</b> (India) = <b>1.940</b>
<b>GIF</b> (Australia) = <b>0.564</b>	<b>ESJI</b> (KZ) = <b>8.771</b>	<b>IBI</b> (India) = <b>4.260</b>
<b>JIF</b> = <b>1.500</b>	<b>SJIF</b> (Morocco) = <b>7.184</b>	<b>OAJI</b> (USA) = <b>0.350</b>

SOI: [1.1/TAS](#) DOI: [10.15863/TAS](#)

**International Scientific Journal**  
**Theoretical & Applied Science**

p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online)

Year: 2022 Issue: 06 Volume: 110

Published: 06.06.2022 <http://T-Science.org>

Issue

Article



**Sayfulla Ibodulloevich Nazarov**  
Bukhara State University  
cand. tech. Sciences, Associate Professor,  
Uzbekistan, Bukhara  
[umumiynoorganika@gmail.com](mailto:umumiynoorganika@gmail.com)

**Ilgor Ilkhomovich Norov**  
Bukhara State University  
Uzbekistan, Bukhara  
[ilgornorov@gmail.com](mailto:ilgornorov@gmail.com)

**Sitora Faxriddinovna Sulstonova**  
National University of Uzbekistan  
Uzbekistan, Tashkent  
[dilsitor@gmail.com](mailto:dilsitor@gmail.com)

## PROPERTY OF YARN TREATED WITH MODIFIED STARCH

**Abstract:** This article presents the results of a study of the physical and mechanical properties of yarn based on modified starch.

**Key words:** starch, sizing, sodium carboxymethyl starch, Hydrolyzed polyacrylonitrile, polymer composition, viscosity, adhesion, rheology.

**Language:** English

**Citation:** Nazarov, S. I., Norov, I. I., & Sulstonova, S. F. (2022). Property of yarn treated with modified starch. *ISJ Theoretical & Applied Science*, 06 (110), 89-92.

**Soi:** <http://s-o-i.org/1.1/TAS-06-110-12> **Doi:** <https://dx.doi.org/10.15863/TAS.2022.06.110.12>

**Scopus ASCC:** 1500.

### Introduction

The viscosity of sizing agents is one of their main indicators, which should be within the optimal value, as a result of which a protective film is formed on the surface of the yarn, which gives the yarn strength and elasticity[1-3]. The results of changing the viscosity of the solution at various concentrations are shown in table 1.

The study of the dependence of the viscosity of the composition containing 5-7% starch, 0.4-0.7% HPAN and 0.03-0.06% Na-CMS showed that all the studied solutions have the required viscosity. In this case, changing the concentration of Na-CMS from 0.03% to 0.06% significantly affects the structural and mechanical properties of starch-based compositions[4-6].

**Table 1. Change in the viscosity of the solution depending on the content of modified starch (T=298K, cottonseed oil 0,03 %).**

Rice starch, %	HPAN, %	Change in solution viscosity at different concentrations (%) Na-CMS, (Pa.s)			
		0,03	0,04	0,05	0,06
	0,4	1,10	1,17	1,26	1,40

<b>Impact Factor:</b>	<b>ISRA (India) = 6.317</b>	<b>SIS (USA) = 0.912</b>	<b>ICV (Poland) = 6.630</b>
	<b>ISI (Dubai, UAE) = 1.582</b>	<b>PIIHQ (Russia) = 3.939</b>	<b>PIF (India) = 1.940</b>
	<b>GIF (Australia) = 0.564</b>	<b>ESJI (KZ) = 8.771</b>	<b>IBI (India) = 4.260</b>
	<b>JIF = 1.500</b>	<b>SJIF (Morocco) = 7.184</b>	<b>OAJI (USA) = 0.350</b>

5	0,5	1,19	1,28	1,44	1,70
	0,6	1,36	1,51	1,65	2,05
	0,7	1,75	1,93	2,25	2,61
6	0,4	1,21	1,33	1,44	1,62
	0,5	1,34	1,50	1,72	1,95
	0,6	1,55	1,68	1,93	2,20
	0,7	1,78	2,13	2,41	2,71
7	0,4	1,32	1,41	1,55	1,72
	0,5	1,44	1,64	1,91	2,11
	0,6	1,71	1,82	2,13	2,35
	0,7	2,01	2,23	2,64	2,89

The sizing process affects the breaking of the yarn under force, i.e. the strength of the sized yarn increases compared to conventional yarn. Thus, in the course of the study, differences were revealed between the rupture of sized and non-sized yarns under the action of force. The results obtained are presented in table 2.

The results show that not only the amount of starch and HPAN, but also, to a certain extent, the amount of Na-CMS depends on the breakage of the sized yarn.

For example, the yarn breaking under force is 391 cN in the presence of 6% -starch, HPAN-0.5% and 0.04% Na-CMS, with an increase in the concentration of starch to 7% and Na-CMS to 0.05%

force breakage increases to 398 cN. Thus, the study of the dependence of the physicochemical and physico-mechanical properties of sized yarn on the chemical nature and concentration of the components satisfies the requirements for adhesive and film-forming components of modified starch with HPAN and Na-CMS. According to the work performed, it can be concluded that the composition with good rheological and physical and mechanical properties of the yarn consists of the following components: 6% rice starch, 0.5% HPAN and 0.04% Na-CMS.

As can be seen from Table 3, the physical and mechanical properties of modified starch yarn meet all the requirements for the weaving process.

**Table 2. Physical and mechanical characteristics of sized yarn with modified starch (cottonseed oil 0,03 %)**

Composition of modified starch, %			pH	Force break, P,cN	Elongation, E, %	Gluing, K,%
Starch	HPAN	Na-CMS				
5	0,4	0,03	7,2	347	20,63	3,01
	0,5	0,03	7,0	380	22,68	3,52
	0,6	0,03	6,9	395	23,85	4,28
6	0,4	0,04	7,3	375	22,68	4,49
	0,5	0,04	7,0	391	23,93	4,77
	0,6	0,04	6,8	414	24,15	5,61
7	0,4	0,05	7,7	387	23,21	4,91
	0,5	0,05	7,3	398	25,28	5,94
	0,6	0,05	6,8	416	26,40	7,09

<b>Impact Factor:</b>	<b>ISRA (India) = 6.317</b>	<b>SIS (USA) = 0.912</b>	<b>ICV (Poland) = 6.630</b>
	<b>ISI (Dubai, UAE) = 1.582</b>	<b>PIIHQ (Russia) = 3.939</b>	<b>PIF (India) = 1.940</b>
	<b>GIF (Australia) = 0.564</b>	<b>ESJI (KZ) = 8.771</b>	<b>IBI (India) = 4.260</b>
	<b>JIF = 1.500</b>	<b>SJIF (Morocco) = 7.184</b>	<b>OAJI (USA) = 0.350</b>

**Table 3. Comparative physical and mechanical characteristics of yarn according to the composition of the sizing component**

Technological indicators	Size types		
	Corn starch	Rice starch	Modified starch
Sizing viscosity, Pa.s:	1,40	1,20	1,50
In the Chanda sizing bath	1,15	1,05	1,20
Breakage, %	0,38	0,50	0,35
Average strength, N:	262	250	267
Softly sized	383	373,7	393
Medium elongation, %	2,80	3,00	2,65

The breakage of yarn sized on a loom is lower than the breakage of yarn sized by other types of starch, with this in mind, it is recommended to introduce the development into production[7-9].

The treatment of yarn with the proposed compositions increases their technological characteristics, i.e. allows you to reduce the number of breaks on the loom by 8-12%.

The decrease in yarn breakage during sizing is due to the high permeability of the modified starch solution and the formation of a strong smooth film[10]. Due to these properties, the solution is easily absorbed by the yarn, gives the yarn strength and elasticity after drying and protects them from mechanical damage.

#### References:

- Nijozov, Je.D., Norov, I.I., & Sultonova, S.F. (2021). Fiziko-mehaniicheskie svojstva shlihtovannoj prjazhi na osnove modifitsirovannogo krahmala. *Journal Sciences of Europe*, V.1, N71, pp. 6-8.
- Ismatova, R., Norov, I., Amonov, M., & Ibragimova, F. (2019). Sizing polymer compositions on the base of starch and polyvinyl alcohol. *Austrian Journal of Technical and Natural Sciences*, N11-12, pp. 41-44.
- Sultonova, S.F., Norov, I.I., & Zhumaeva, D.K. (2021). *Svojstva polimernyh kompozitsij na osnove kalievoj soli polifosfornoj kisloty i krahmala dlja shlihtovaniya nitej*. Omega sajns. Tez. Dokl. sbornik statej Mezhdunarodnoj nauchno-prakticheskoj konferencii. (pp.11-13). Kaluga.
- Razzokov, H.K., Nazarov, N.I., Hudoyberdiev, S.S., & Ortikov, Sh.Sh. (2021). *Razrabotka tehnologii poluchenija shlihtuushhih komponentov na osnove prirodnyh i sinteticheskikh polimerov*. Sbornik trudov mezhduna-rodnoj nauchno-teoreticheskoj konferencii na temu: «Kuatbekovskie chtenija-1: Uroki Nezavisimosti», posvjashhennoj 30-letiu Nezavisimosti Respubliki Kazahstan. (pp.105-107). Shimkent.
- Nijozov, E.D., Norov, I.I., Ilxomov, A.A., & Ahmedova, Sh.M. (2021). Kalava iplarni oxorlash uchun krahmalni polifosfat kislotaning kalijli tuzi bilan modifikatsiyalab olingan polimer kompozitsiyalarni reologik hossalarni tadbik kilish. *"Science and Education" Scientific Journal January*, Volume 2, Issue 1.
- Nijozov, E.D., Norov, I.I., & Ortikov, Sh.Sh. (2022). Osobennosti primeneniya v tekstil'noj promyshlennosti sinteticheskikh polimer-nyh kompozitsij rastvorimyh v prirodnoj vode. *Universum: tehniicheskie nauki*, №4, pp. 47-50.
- Nazarov, S. I., Niyozov, E. D., Shirinov, G.K., & Ostonov, F.I. (2020). Research and development of thickening compositions based on modified starch. *Universum: chemistry and biology*, № 3(69), pp. 42-46.
- Nazarov, S.I., Amonova, M.M., & Nazarov, N.I. (2015). Fundamentals of obtaining starch phosphates and studying their properties. *Scientific Bulletin of BukhGU*, Bukhara, No. 1, pp. 28-31.
- Nazarov, S. I., Niyozov, E. D., Sharipov, M. S., & Nazarov, N. I. (2015). *A new thickener based on carboxymethyl starch and water-soluble polymers for stuffing cotton fabrics*. Material of the international scientific-practical conference

<b>Impact Factor:</b>	<b>ISRA (India) = 6.317</b>	<b>SIS (USA) = 0.912</b>	<b>ICV (Poland) = 6.630</b>
	<b>ISI (Dubai, UAE) = 1.582</b>	<b>ПИИИ (Russia) = 3.939</b>	<b>PIF (India) = 1.940</b>
	<b>GIF (Australia) = 0.564</b>	<b>ESJI (KZ) = 8.771</b>	<b>IBI (India) = 4.260</b>
	<b>JIF = 1.500</b>	<b>SJIF (Morocco) = 7.184</b>	<b>OAJI (USA) = 0.350</b>

---

- "Actual problems of chemical technology industries". (pp.240-243). Bukhara.
10. Amonov, M. R., Sharipov, M. S., & Nazarov, S.I. (2010). Study of the rheological properties

of thickener polymers and new compositions based on them. *Composite Materials*, Tashkent, № 1, pp. 9-12.