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EFFECT OF RADIATION ON PHYSICAL-MECHANICAL PROPERTIES OF SILK THREADS

Abstract: *this article discusses the impact of radiation on the physical and mechanical properties of silk threads. Authors of the article consider that raw silk and boiled dyeing of the thread under the influence of gamma rays improve their physical and mechanical properties and increase the strength of the thread. The change in permeability can be explained as follows.*

Key words: *breakage, extensions, gamma, radiation, silk - raw values, silk, strength, threads, weaving.*

Language: *English*

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Introduction

In matter, molecules are bound by a specific energy bond. When a powerful flux of gamma rays acts on a substance, molecular bonds are broken apart by molecules. Some broken molecules are released as a free radical, and fragments of radicals are released and form a gaseous state. [1, p. 153; 2, p. 238]. Two broken molecules stretching among themselves and with other molecular beams form new molecular bonds that improve the state of the textile material. Studies have shown that for silk threads it is possible to select conditions under which their physical and

mechanical properties improve, and this, in turn, helps to reduce breakage during weaving and increase the release of silk fabrics, such conditions are the processing of threads using radiation.

Materials and Methods

We have studied the influence of radiation on the physical and mechanical properties of the warp and weft threads. The radiation was conducted according to the developed method. A number of preliminary results have been obtained that give grounds to strengthen the research in this direction. Experimental

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results have shown that raw silk and boiled dyeing threads under the influence of gamma rays improve their physical and mechanical properties compared to non-irradiated samples. To study the effect of irradiation on the physical and mechanical properties of raw silk "3.23 Tex" and boiled silk "3.23 Tex x4", samples were prepared with a length of 100 m and wound on a cylindrical paper 50 mm long. Thus, a number of samples were prepared for irradiation with various integral doses.

Irradiation was performed at a gamma-ray facility at the Institute of nuclear physics of the Academy of Sciences of the Republic of Uzbekistan. The source of gamma rays was C_{60}^{60} . ($T_{1/2} = 5.7$ year, $E = 1.7$ MeV $E = 1.33$ MeV).[7; 8]

These gamma installations have a capacity of up to 5-2300 R/s. Testing of control and irradiated samples for breaking strength and elongation was performed on a dynamometer. Irradiated samples were tested from 100 to 300 times and the average values of breaking strength and elongation were derived from the results obtained. The average percentage of breaking strength was obtained by comparing its control and maximum values. When conducting experiments, we determined the required number of tests for a given error not exceeding 5 %.[3; 4, p. 32]

In this case, the normalized deviation t , determined for the normal distribution depending on the number of tests n , was assumed to be equal to 2 in the order of first approximation.

Analysis of curves (Fig.1-2) showed that silk threads at a certain dose of radiation dramatically change their physical and mechanical properties.

The figures show that the main improvement in mechanical properties occurs at radiation doses. 10-2-10-1mrad. [9; 10, p. 148]

Raw silk at these doses increases the breaking strength to 56 %, boiled silk to 22 %, The endurance of raw silk under repeated stretching is 76%, and boiled silk is 28% higher compared to a relatively unirradiated sample. The change in strength can be explained as follows. In a substance, molecules are bound by a certain binding energy. When a powerful stream of gamma rays affects a substance, molecular bonds are broken in a number of molecules. Some broken molecules are released as a free radical, and the fragments of the radicals are released and form a gaseous state. Two broken molecules, connecting with each other and with other molecular bundles, form new molecular bonds that improve the condition of the textile material. Recently, various monomers have been used as a catalyst.[6; 11; 12]

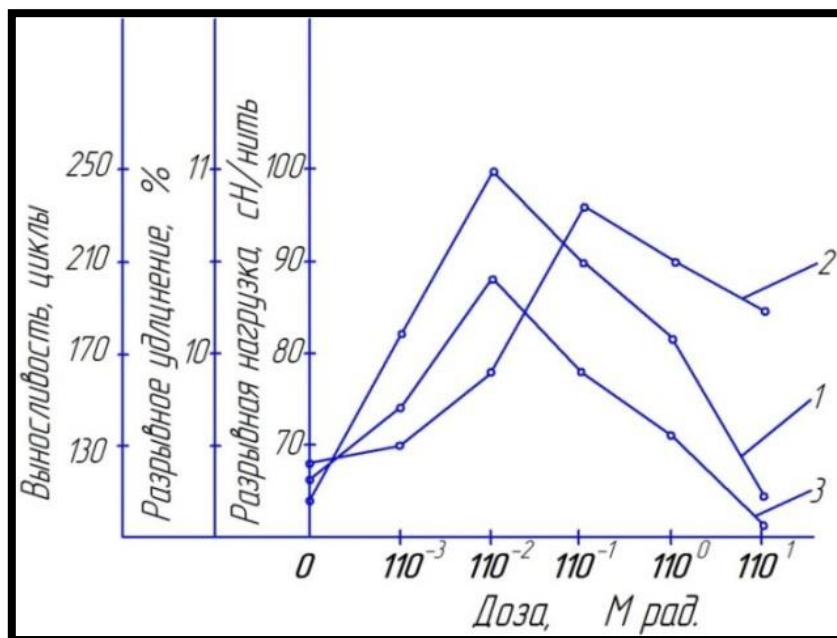


Figure-1.

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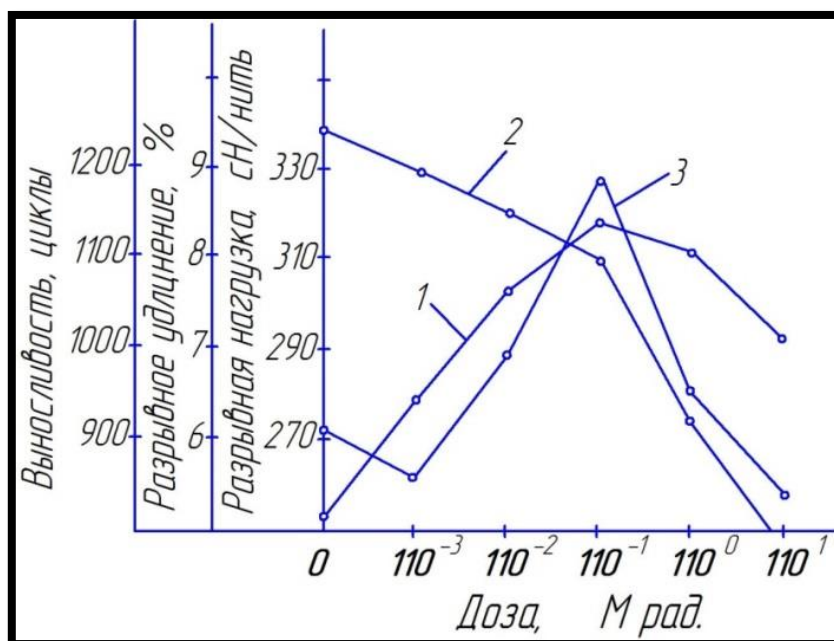


Figure-2.

If the sample is irradiated in a vacuum with monomers, they additionally create a bond between the broken molecules when the molecular chains are broken and form new molecular chains that positively affect the physical and mechanical properties and thermal conductivity.

These processes occur only at a certain integral radiation dose. At high integral doses of radiation, substances completely turn into powder, which means that all molecular bonds are broken. Another proof of breaking molecular chains at a high dose of radiation is the rapid release of free radicals in the form of gas. This release of gases is so great that sometimes a glass ampoule with a sealed sample explodes. From the

above data, we conclude that for textile materials, you can also choose conditions that improve the physical and mechanical properties of the warp and weft threads, and this in turn will help reduce breakage in the weaving process.

Conclusion

Studies have shown that for silk threads it is possible to select conditions under which their physico-mechanical properties are improved, and this in turn helps to reduce breakage during weaving and increase silk cloth yield, such conditions are the processing of threads using radiation.

References:

1. Vlasov, P. V. (1963). Issledovanie vozmozhnostej primeneniya radioaktivnogo izlucheniya pri normalizacii processa tkachestva. *Gizlegprom*, 1(2), 150.
2. Safonov, P. E., Levakova, N. M., & Gorynina, E. M. (2019). Razrabotka ogne-i termostojkoj tkani s jeffektom jekranirovaniya jelektromagnitnogo izlucheniya. *Fizika voloknistyh materialov: struktura, svojstva, naukoemkie tehnologii i materialy (SMARTEX)*, (1-1), 236-241.
3. Husanboev, A. M., Toshkuzieva, Z. Je., & Nurmatova, S. S. (2020). Prijom deleniya ostrogo ugla na tri ravnye chasti. *Problemy sovremennoj nauki i obrazovanija*, (1) (146).
4. Hari, P. K. (2020). Types and properties of fibres and yarns used in weaving. In *Woven Textiles* (pp. 3-34). Woodhead Publishing.
5. Usmanov, D. A., Holmurzaev, A. A., & Umarova, M. O. (2019). Sushka i ochistka hlopka-syrca v polevyh uslovijah. *Problemy sovremennoj nauki i obrazovanija*, (12-2) (145).
6. Siddikov, P., & Umarova, M. O. (2020). About form libit and methods determination parameter wind threads of the base on libit-warping drum. *EPRA International Journal of Research &*

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- Development (IJRD)*, 5(3), 100-105.
<https://doi.org/10.36713/epra2337>
7. Usmanov, D. A., Holmurzaev, A. A., & Umarova, M. O. (2020). Sohranenie fiziko-mehaničeskikh svojstv hlopka-syrca pri hranenii. *Problemy sovremennoj nauki i obrazovanija*, 3 (148).
 8. Usmanov, D. A., Holmurzaev, A. A., & Umarova, M. O. (2020). issledovanie jeffektivnosti ochistki tonkovoloknistyh sortov hlopka-syrca. *Problemy sovremennoj nauki i obrazovanija*, 1 (146).
 9. Takeshita, H., Ishida, K., Kamiishi, Y., Yoshii, F., & Kume, T. (2000). Production of fine powder from silk by radiation. *Macromolecular Materials and Engineering*, 283(1), 126-131.
 10. Muthesius, A. (2002). Essential processes, looms, and technical aspects of the production of silk textiles. The economic history of Byzantium: *From the seventh through the fifteenth century*, 1, 147-168.
 11. Kostin, S. L. (2004). *Razrabotka metodov tehničeskogo kontrolja strukturnyh parametrov tkannyh poloten*. Doctoral dissertation, [Ivan. gos. tekstil. akad.].
 12. Zashhepkina, N. M., & Zdorenko, V. (2007). *Ul'trazvukovij pristrij dlja tehničnogo kontrolu jakosti tekstil'nih materialiv*. Kiivs'kogo nacional'nogo universitetu tehnologij ta dizajnu, 40.