STUDYING THE POSSIBILITIES OF SYNTHETIC FINTING AND ANTISTATIC COSTS

Shamanov Sh.Kh*; Khasanova S.Kh; Kholmurodov Sh.F*****

*Tashkent Institute of Textile and Light Industry,
Samarkand, UZBEKISTAN

**Tashkent Institute of Textile and Light Industry,
Samarkand, UZBEKISTAN

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ABSTRACT

The possibilities of reducing the electrical conductivity of fibers formed by the dry method from polyethylene terephthalate granules are investigated. The effect of the antistatic drug concentration on the fiber color parameters was analyzed. It has been shown that as a result of antistatic finishing, the color intensity of the dyed fiber increases, the difference in color tone is relatively small.

KEYWORDS: *Polyethylene Terephthalate Granules, Polyester Fiber, Fiber Forming, Masterbach Concentrate, Color Chart, Color Space, Color Intensity.*

INTRODUCTION

Manufacturing chemical fibers and yarns is an important sector of the modern world economy, which is developing dynamically despite market volatility. Today, polyester fibers occupy the highest position in terms of production volume among all fibers produced worldwide. In recent decades, the world's production of chemical fibers and yarns has grown significantly, including 64% of chemical fibers and yarns, which account for 70% of the world textile market, and 6% of cellulose-based fibers.

Main part

Primary and secondary PET granules produced by foreign (Russian and Korean) companies and scientists of the Tashkent Institute of Chemical Technology obtained a product of alcoholization of secondary polyethylene terephthalate with ethylene glycol on the basis of bishydroxyethylene terephthalate (Fig. 1).

A B C

Figure 1. Primary (A), secondary (B) PET granules and

BGET (C) based PET

It is known that prolonged exposure of a fiber-forming polymer to high temperatures leads to a decrease in the viscosity of the resulting polymer solution, inter-packing bonding forces, and increased mobility of structural elements.Although the temperature of liquefaction of polyethylene terephthalate is 240 ° C, due to its high viscosity, its processing is carried out at a temperature of 290-295 ° C, but the beginning of the decomposition process in the polymer is not neglected. The results of heating PET granules are given in Table 1. No change was observed in the temperature range of 240–250 ° C in the primary and secondary PET granules, but the temperature rise resulted in a reduction in the transition time to the liquid. In BGTF-based polyethylene terephthalate there was no change at a temperature of 200-220 0S, although the polymer was melted at a temperature of 230-240 0S, no fiber was formed, at a temperature of 250-260 0S the polymer viscosity decreased, became liquid.

TABLE 1 THE EFFECT OF TEMPERATURE ON THE TRANSITION TIME OF PET GRANULES TO LIQUEFACTION

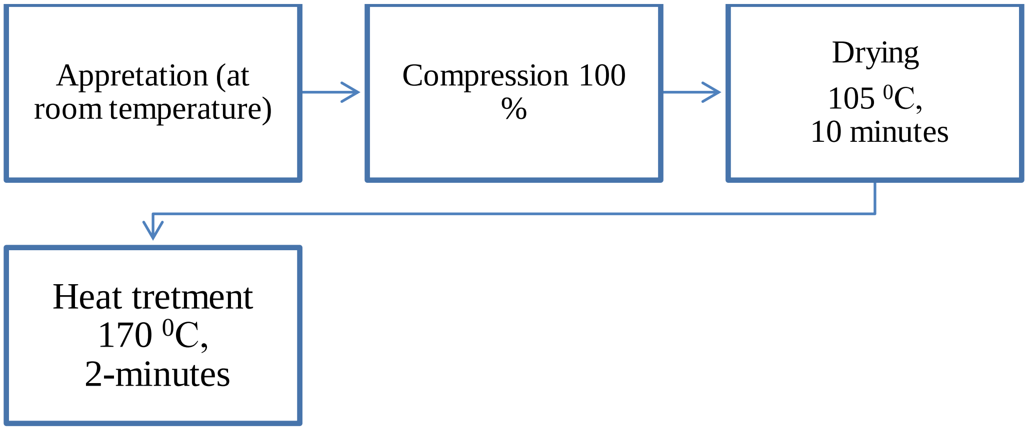
Types of granules	Effect of temperature, °S				
	200-220	230-240	240-250	260	270
Primary PET	-	-	-	410 sec	240 sec
Secondary PET	-	-	-	402 sec	227 sec
BGTF based PET	-	420 sec	300 sec	180 sec	125 sec

The fiber was formed based on the conditions proposed before the selected granules. Fiber forming process speed 60 m / min, fiber extraction temperature 270-280 ° C. The realization of the fiber was not due to the flow of the polymer liquid under pressure from the filler holes, but due to the immersion and gradual pulling of the end of the colored wire connected to the thin wire into the PET solution.

Typically, a tendency to accumulate and store high levels of electrical charge is observed in hydrophobic synthetic fibers, whereas hydrophilic cellulose and protein fibers accumulate a small amount of electrical charge and lose it much more rapidly. The effect of air humidity on the electrostatic charge of hydrophobic synthetic fibers is very low, so they undergo special antistatic treatment. Textile auxiliary surfactants of noionogenic, cationic and anionactive types based on fatty acids or alcohols are used as antistatic drugs.The cation-active SAM-triamonewas selected for the study. In order to give antistatic finish to the fibers formed from primary and secondary PET granules, the drug triamone was added to the proposed composition for dyeing in solution with a disperse dye in an amount of 3-9% by weight of fiber. Antistatic make-up was applied to the fibers in both white and dyed state, and the finishing process was carried out in one- and two-bath methods. CIE L*a*b* color space and color graph were used to represent the color of the processed samples.

In the first stage of double-bath finishing of fibers obtained on the basis of polyethylene terephthalate granules, the placement of the dye in the fiber structure revealed the formation of high-intensity and water-resistant dyes in the fiber.In the second stage, experimental results showed that the active cation - triamone - binds to the functional groups of fibers and reduces the specific surface electrical resistance.

Mass dyed fibers with Masterbach concentrate were antistatic treated in the following technological sequence:



CIE L*a*b* color space and color graph were used to represent the color of the processed samples (Figure 1).

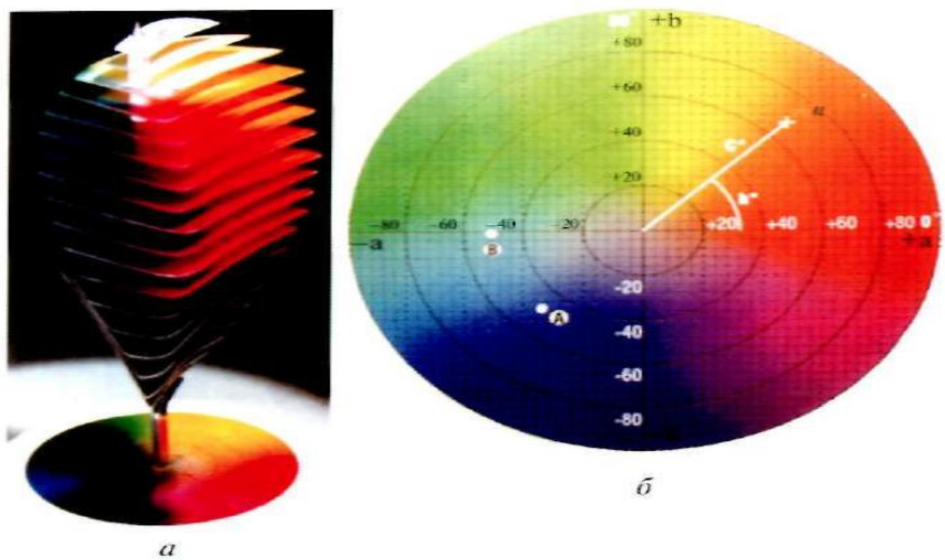


Figure 2. CIE L*a*b* color space and color graph

The brightness L* in this space varies along an achromatic axis perpendicular to the plane of the a* and b* axes. a* corresponds to the change of the arrow in the "red-green" direction, b* corresponds to the change of the arrow in the "yellow-blue" direction.

The concentration of triamone in the composition of the appraisal was changed in the range of 3-9%. The color performance of the processed samples was measured (Table 2).

TABLE 2 EFFECT OF TRIAMONE CONCENTRATION ON FIBER COLOR PERFORMANCE

Triamone concentration, %	Color difference, d E*	Color brightness, L*	Color coordinates, a*	Rangkoordinatasi, b*
3	0.02	31.02	34.07	24.84
5	0.10	29.81	38.77	18.87
7	0.05	28.27	39.03	17.23
9	0.10	27.91	46.55	15.46
Dyed fiber	0.04	28.87	41.81	24.18

As the triamon concentration increases, the L* whiteness of the fiber color decreases, the color intensity increases, and in the color space, the color shifts along the a* axis to the red side, and along the b* axis, the color shifts from yellow to blue.

In addition, for the purpose of antistatic coating of fibers formed from primary and secondary PET granules, triamone was added to the proposed composition for dyeing in solution with a disperse dye in an amount of 3-9% by weight of fiber. As a result of the research, a content and technological sequence for a combined dyeing and antistatic finishing process was proposed.

Disperse dye – 3 %

Intensifier -3 g/l

SAM – 2 g/l

Acetic acid – rN=5,5-6

Triamon – 3-9%

Process duration – 1 hour

CONCLUSION

Intensifier - high-intensity coloring was achieved as a result of sorption of dye particles dispersed under the influence of SAM on the loose fiber structure under the action of salicylic acid.

An antistatic drug - an increase in the amount of triamone causes the formation of a blue color in the red color of the fiber. The color difference dE in the processed fiber samples will have a small value.

REFERENCES

1. ITS-39-2017. Proizvodstvotekstilnыxizdeliy [Manufacture of textiles] (promыvka, otbelivanie, merserizatsiya, krashenietekstilnыxvolokon, otbelivanie, krashenietekstilnoyproduksii), 2017, 366p.
2. KrichevskiyG.Ye. Ximicheskayatexnologiyatekstilnыxmaterialov[Chemical technology of textile materials]. T.3. zaklyuchitelnayaotdelkatekstilnыxmaterialov, M, 2001, 298p.
3. Sh. Nazarova, Z. Fayzullaeva, Sh. ShamanovvaS. Xasanova “Tarkibitabiiyvasintetiktolalito‘qimagaantistatikpardozberish[The composition gives

antistatic makeup to natural and synthetic fibrous tissue]" «To‘qimachiliktolalarinichuqurqaytaishlashninginnovatsionyechimlari" (O‘zTTITI-2019) [Matn]: Respublikailmiy-texnikaviyanjumanmateriallarito‘plami, 19-20 oktabr 2020 yil. – Farg‘ona.: «CLASSIC» nashriyoti 2020. 224 bet.

4. M. Ro‘ziev, Sh. X. Shamanov, S. X. Xasanova "Polietilenterftalatasosidatolaolishjarayoninio‘rganish[Study of the process of fiber production on the basis of polyethylene phthalate]". Proceedings of the scientific-practical conference. Tashkent – 2018.

5. Dos. S. X. Xasanova, ass. Sh. X. Shamanov, magistrM. S. Ro‘ziev "Poliefirtolasisorbsionxossalarinio‘rganish[Study of the sorption properties of polyester fibers]". In International scientific-practical conferenceon "Problems of increasing the efficiency of modern production and energy saving". Andijan – 2018.

6. S.V. Petrova-KuminskayaA.V. Mironova, O.A. Garanina.Bo‘yashjarayonidapoliefirtolatutganto‘qimachilikmateriallarigaantibakterialxususiyatberish[To give antibacterial properties to textile materials containing polyester fibers during dyeing].Vestnikvitebskogogosudarstvennogotexnologicheskogouniversiteta, 2017, № 1 (32), s.155-163

7. MagistrM. S. Ro‘ziev, dos. S. X. Xasanova "Polietilentereftalatgranulasidanshakllantirilgantolaniranglashjarayoninio‘rganish[Study of the process of dyeing of fibers formed from polyethylene terephthalate granules]". A collection of scientific articles of graduate students. Tashkent – 2019.