

COLOURABILITY AND FASTNESS OF COLOURED POLYESTER KNITTED FABRIC AFTER PRETREATMENT

**Marija Kodrić^{1,*} [ID](#), Shahidul Islam² [ID](#), Zorica Eraković³ [ID](#), Predrag Tasić⁴ [ID](#),
Dragan Đorđević³ [ID](#)**

¹Innovation Center, University of Nis, Niš, Serbia

²Department of Textile Engineering, BGMEA University of Fashion and Technology (BUFT), Dhaka, Bangladesh

³University of Niš, Faculty of Technology in Leskovac, Leskovac, Serbia

⁴V.I. Vunil d.o.o, Leskovac, Serbia

The effects of pretreatment on the dyeing efficiency of polyester knitted fabric using a yellow disperse dye were investigated in this study. The raw fabric was pretreated with an alkaline solution (calcium hydroxide) and pure higher alcohols (1-pentanol and 1-octanol), while dyeing was carried out in the presence of an environmentally friendly carrier (caffeine). The results showed that pretreatment improved dye uptake during the dyeing process. Significant weight loss was observed after treatment with 1-octanol (8.2%), resulting in the greatest fabric swelling (thickness increase). Shrinkage was uniform across all samples, averaging around 3%. The tensile strength of the pretreated fabric was slightly reduced, particularly in the sample treated with alkali. The CIELab colour system parameters showed more intense colouring in all samples; for example, the sample modified with 1-octanol exhibited the darkest shade. The sample pretreated with 1-octanol was the darkest, as confirmed by the highest difference in lightness ($\Delta L = -18.23$). In addition, its high chroma ($C = 32.47$) and hue angle ($H = 86.23$) contribute to a pronounced yellow colouration with good brilliance. These CIELab parameters, along with the subjective evaluation of colour levelness, confirm the significant colouration and the effectiveness of this modification in achieving intense and uniform dyeing. Caffeine proved to be an effective, non-toxic carrier, enabling better dyeing results than procedures without a carrier or those using a conventional carrier. The colour fastness of the pretreated polyester knitted fabrics to light, washing, rubbing, seawater, and water drops was found to be satisfactory and acceptable.

Keywords: polyester, pretreatment, dyeing, CIELab, colour fastness.

* Author address: Marija Kodrić, Innovation Center, University of Nis, University Square 2, Niš, Serbia

e-mail address: izida50@gmail.com



INTRODUCTION

Polyester (PES) is one of the most widely used synthetic polymers in the textile industry, thanks to its high mechanical strength, durability, affordable cost, and excellent performance in everyday use. Its chemical structure is based on repeating units of terephthalic acid and ethylene glycol, resulting in fibers with high crystallinity and good resistance to abrasion, wrinkling, and photoaging. Polyester fibers are also characterized by low moisture absorption, making them suitable for use in outdoor clothing, sports equipment, technical textiles, and furniture [1,2].

However, the very low moisture absorption, as well as the hydrophobic nature and smooth surface of the fibers, present a challenge when dyeing, as they reduce the affinity for dyes. Disperse dyes, which are the most commonly used for dyeing PES materials, require specific conditions for successful fixation in the fibers. Therefore, dyeing polyester is significantly more demanding compared to natural fibers such as cotton or wool [3,4].

There is a continuous effort to improve the performance properties of existing PES fibers through physical and chemical modifications. Today, polyester fibers with sufficient hydrophilicity and enhanced dyeability are being developed. The wetting and absorption of liquids, including dyes, are fundamentally important in many industrial processes, influencing both the conventional and functional properties of fibrous materials [5].

Alkaline hydrolysis of polyester fabrics is one of the possible methods for modifying polyester in order to enhance its comfort and wearability. Fabrics treated with alkali exhibit improved aesthetic appearance and drape, a softer handle (touch), and greater comfort, with properties similar to silk. In addition to these primary effects, treated materials show reduced pilling tendency, increased resistance to soiling, and improved hydrophilicity. At the same time, alkaline treatment effectively removes oligomers by breaking them down into water-soluble molecules [6,7].

Standard dyeing procedures for polyester require the application of high operating temperatures (above 120 °C) and specific auxiliary agents, carriers, which enhance the dye's penetration into the fibers. Unfortunately, many of these carriers harm the environment due to their toxicity and long-term biodegradability. Therefore, current research is focused on developing alternative technological approaches that would enable high-quality dyeing at lower temperatures, while reducing the use of harmful chemicals [8,9].

Chemical surface modification of polyester fibers through alkaline hydrolysis using a calcium hydroxide ($\text{Ca}(\text{OH})_2$) solution in the presence of 1-pentanol and 1-octanol represents a promising method for increasing hydrophilicity and creating microporous structures on the fiber surface. These changes enable better diffusion of dispersed dyes, which can contribute to improved dyeing performance.

The dyeing process was carried out using an environmentally friendly carrier, caffeine, at a temperature of 95 °C for 60 minutes, in an Original Hanau Linitest (Hanau, Germany) apparatus. This study aims to investigate the effect of chemical surface modification of PES knit fabric and the use of caffeine as a natural carrier on the physical properties of the fabric and the quality of dyeing with disperse dyes. This research contributes to the



development of sustainable and environmentally friendly technologies in the textile industry, with the potential to reduce negative environmental impacts.

MATERIALS AND METHODS

In this experiment, 100% polyester knit fabric (PET - polyethylene terephthalate) with a surface mass of 135 g/m² was used. The pretreatment of the PES knit was carried out through three procedures. The first procedure involved chemical modification in a calcium hydroxide solution (40 g/dm³) in water at 40 °C, with a bath ratio of 1:60, for 60 minutes. This was followed by rinsing with distilled water, neutralization with formic acid (2 g/dm³), washing with Sarabid DLO, a non-ionic surfactant based on a combination of specific oxyethylates (2 g/dm³, 20 minutes at 60 °C), a second rinse, and drying at room temperature.

The second and third procedures were performed using pure alcohols: 1-pentanol and 1-octanol, under the same conditions (40 °C, 1:60, 60 minutes), followed by drying, non-ionic surfactant washing, rinsing, and drying. The abbreviated labels for these procedures are: Ca(OH)₂-H₂O, 1-pentanol, and 1-octanol.

The knit fabric was then dyed with the disperse dye C.I. Disperse Yellow 54 in the presence of a natural carrier — caffeine (1% relative to the weight of the fabric) at a temperature of 95 °C for 60 minutes, in an Original Hanau Linitest (Hanau, Germany) apparatus.

The physical and mechanical properties of the samples were evaluated by measuring weight loss, thickness, shrinkage, and bursting strength. Dyeing performance was assessed using CIELab parameters.

The change in mass (Δm , %) of textile samples was expressed as a percentage relative to the mass of the control (unmodified) sample and was calculated based on the difference in mass before and after treatment:

$$\Delta m = \frac{m_0 - m_1}{m_0} \cdot 100 \quad (1)$$

where m_1 is the mass of the sample after treatment (g), and m_0 is the mass of the unmodified sample (g).

Thickness was measured using a device called a thickness gauge. The apparatus consists of two parallel metal plates, between which the material is placed. The pressure of the upper plate on the tested product depends on the type of textile material. If not specified by the standard, a pressure of 50 cN/cm² is applied for all textile materials. The thickness of the knitted fabric was measured in accordance with the SRPS EN ISO 5084:2013 standard. Five measurements were carried out, and the mean value was calculated.

Dimensional stability was determined in line with SRPS EN ISO 5077:2010. According to the new procedure, the standards SRPS EN ISO 3759:2012 and SRPS EN ISO 6330:2022 are used together. On the test sample, markings were made in three places in both length and width, and the mean value of the three results was calculated.



Bursting strength of the knit fabric was measured according to SRPS F.S2.022:2017. This standard determines the resistance of textiles to rupture under the pressure of a steel ball and applies to all textile products regardless of composition, structure, or shape. Bursting strength is expressed as the maximum force (daN) causing the fabric to rupture. Five measurements were carried out, and the mean value was calculated.

Colour fastness to light was determined according to SRPS EN ISO 105-B02:2015. Testing was carried out on a Xenotest “Hanau” apparatus, Germany, No. 507 S-2253, using blue wool reference fabrics (ratings 1–8) supplied by SDC Enterprises Limited, United Kingdom. A total of three samples were tested. The exposure time to light was 72 hours. A xenon arc lamp simulating sunlight was used. After exposure, the light-exposed and covered parts of the samples, as well as the reference blue wool fabrics, were compared. Evaluation was performed using the grey scale, with values calculated from spectrophotometric remission measurements on a Spectraflash 300, Datacolor instrument under D65, A, and F8B2 illumination, 8° geometry.

Colour fastness to rubbing was tested in accordance with SRPS EN ISO 12947-4:2008. The samples were rubbed with dry and wet white fabric for 1,000 cycles, using the specified load according to the standard. Three tests were carried out. The change in appearance and colour transfer were assessed using the grey scale, with values obtained from spectrophotometric remission measurements under the same instrument and illumination conditions as above.

Colour fastness to washing was tested according to SRPS EN ISO 105-C06:2016. Testing was conducted on a Linitest apparatus, in a water bath heated to 40 ± 2 °C. One sample was tested, prepared as a sandwich with adjacent fabrics sized 10 × 5 cm, and three ratings were given, sewn together with white accompanying fabrics — cotton on one side and wool on the other. Detergent type 2705 SDC Sodium Perborate Tetrahydrate was used at a concentration of 5 g/dm³, with a liquor ratio of 50:1. Samples were placed in hermetically sealed metal containers and subjected to 30 minutes of mechanical agitation, then rinsed and dried. Evaluation of colour transfer was made using the grey scale based on spectrophotometric remission measurements (Spectraflash 300, Datacolor, D65/A/F8B2 illumination, 8° geometry).

Colour fastness to seawater was determined according to SRPS EN ISO 105-E02:2013. One sample was tested, prepared as a sandwich with adjacent fabrics sized 10 × 5 cm, and three ratings were given. The sample was immersed in a sodium chloride solution of defined concentration for the duration specified in the standard, then dried. Grey scale evaluation was performed based on spectrophotometric measurements as described above.

Colour fastness to water was assessed according to SRPS EN ISO 105-E01:2014. One sample was tested, prepared as a sandwich with adjacent fabrics sized 10 × 5 cm, and three ratings were given. The assessment of colour fastness to water, based on resistance to fading and colour transfer in contact with water and other textiles. Evaluation was performed using the spectrophotometric remission data as above.

Colour fastness to water spotting was evaluated according to SRPS EN ISO 105-E16:2013. One sample was tested, prepared as a sandwich with adjacent fabrics sized 10 × 5 cm, and three ratings were given, possibly two. Water droplets were applied to the fabric surface for the exposure period specified in the standard. After drying, the



colour change was evaluated using the grey scale, calculated from spectrophotometric remission measurements on the same instrument and illumination conditions.

RESULTS AND DISCUSSION

Table 1 presents the results of testing changes in weight loss, thickness, shrinkage, and bursting strength of the PES knit fabric after prior chemical treatment. The first noticeable effect of polyester modification was the weight loss (ranging from 3.8% to 8.2%, depending on the pretreatment), caused by changes in the surface morphology of the PES fibers due to the action of various chemicals. In the case of the alcohol 1-octanol solution, the weight loss was more pronounced compared to other solutions, which may be attributed to the specific action of higher alcohols involved in polyester hydrolysis and their potential influence on the degradation of the fiber surface layer.

The applied modification led to a significant reduction in fabric thickness, resulting from mass loss due to delamination and peeling of the fiber surface layer. The thickness of the knit fabric showed a direct correlation with weight changes, indicating the impact of chemical treatment on the structural characteristics of the textile. A slight change in thickness was observed due to modification, with the sample treated with $\text{Ca(OH)}_2\text{-H}_2\text{O}$ showing a mild decrease in thickness compared to the untreated sample. In contrast, the samples modified with 1-pentanol and 1-octanol showed a slight increase in thickness. Weight loss indicates the removal of material from the fiber surfaces, but this removal loosens the structure, increases porosity, and allows the fibers to swell and relax, leading to increased thickness. These variations suggest localized structural changes in the fibers occurring during chemical treatment. The most pronounced increase in thickness was recorded in the samples treated with pure alcohols, with all values of this parameter being higher compared to the unmodified sample.

Although more significant changes might have been expected, they were mitigated by the shrinkage of the material that occurred during the warm treatments in a relaxed state (at 40 °C), which contributed to compensating for potentially more drastic variations in thickness.

Table 1. Selected physical properties of PES knitted fabric after pretreatment

Pretreatment Code	Weight Loss (%)	Thickness (mm)	Shrinkage (%)		Bursting Strength (daN)
			Warp	Weft	
-	-	0.95	-	-	58
$\text{Ca(OH)}_2\text{-H}_2\text{O}$	5.0	0.91	3	3	53
1-Pentanol	3.8	0.98	3	3.5	55
1-Oktanol	8.2	1.02	3	3.5	55

Dimensional stability of textile materials is a key requirement, with the goal of minimizing shrinkage during and after processing. Although it is almost inevitable for the material to undergo dimensional changes, such changes must be as small and consistent as possible. Yarn tension during production has a significant influence on subsequent relaxation and, consequently, on dimensional changes.

Dimensional stability is a crucial property of textiles, with the aim of minimizing size alterations. In this case, material shrinkage is the result of fiber relaxation, knit structure,



and the thermodynamic instability of PES fibers during wet and thermal treatment. The greatest shrinkage (3.5%) was recorded with solvent treatments, while the alkaline treatment caused the least (3%). All applied treatments reduced the bursting strength of the PES knit fabric, with the most significant reduction observed after alkaline treatment and the smallest after treatment with alcohols.

The results of CIELab parameters quantify the dyeing outcomes of PES knit fabric following different pretreatments and a single dyeing method — dyeing with the eco-carrier caffeine, at a temperature of 95 °C for 60 minutes. In addition to quantitative results, it is important to emphasize that qualitative, subjective evaluation (e.g., regarding dye levelness or uniformity) significantly contributes to the overall impression of the effectiveness of new solutions and dyeing procedures for polyester. All dyed samples exhibited uniform colouration with acceptable levelness, as confirmed by subjective assessment.

Table 2 presents the CIELab parameters for PES knitted fabrics dyed with disperse yellow dye, following prior modification with different agents (calcium hydroxide, 1-pentanol, and 1-octanol), along with data for the uncoloured reference sample. The lightness component (L^*) is lower in all dyed samples compared to the undyed sample, indicating a darker appearance after dyeing.

Differences are also evident in the colour coordinates (a^* and b^*), as well as in hue angle (H) and chroma (C^*). The a^* values for the samples modified with calcium hydroxide and 1-octanol are significantly lower than those of the sample modified with 1-pentanol, while their b^* values are much higher, resulting in a more intense yellow hue. These variations in hue (H) are also the most pronounced, likely due to the influence of caffeine as an eco-carrier on the dye uptake and shade development in the PES knit, both with and without ultrasound assistance.

Table 2. CIELab system parameters for yellow dyed PES knitted fabric

Undyed PES knit fabric					
Light sources	L^*	a^*	b^*	C^*	H
D65	94.10	−1.06	5.57	5.67	100.75
A	94.36	0.37	5.54	5.56	86.17
FB2	94.31	−0.79	6.24	6.29	97.22
Modified with $\text{Ca(OH)}_2\text{-H}_2\text{O}$ and dyed with DY54 + caffeine					
Light sources	L	a	b	C	H
D65	78.67	6.72	37.10	37.71	79.74
A	81.47	12.00	40.01	41.78	73.30
FB2	80.69	4.12	41.57	41.78	84.33
Modified with 1-pentanol and dyed with DY54 + caffeine					
Light sources	L	a	b	C	H
D65	77.56	22.20	6.10	23.02	15.36
A	80.55	21.33	12.31	24.63	29.98
FB2	79.37	16.14	8.33	18.16	27.30
Modified with 1-octanol and dyed with DY54 + caffeine					
Light sources	L	a	b	C	H
D65	75.87	2.13	32.40	32.47	86.23
A	77.95	7.42	34.06	34.86	77.71
FB2	77.40	0.99	36.24	36.25	88.43



Among the samples, the one modified with 1-octanol exhibited the lowest lightness ($L^* = 75.87$ under D65 illumination), confirming it as the darkest. The colour coordinates ($a^* = 2.13$, $b^* = 32.40$), combined with a hue angle ($H = 86.23$) and chroma ($C^* = 32.47$), confirm a strong yellow tone with high brilliance and good saturation, indicating a significant distance from the neutral grey axis.

Table 3 quantitatively presents the colour differences between the uncoloured PES knit reference sample and the dyed samples modified with different agents and dyed using disperse yellow dye. These differences, expressed as delta values (Δ), were measured under various illumination conditions. The uncoloured, unmodified sample was used as the reference point for comparison with all dyed and modified variants.

As expected, all dyed samples show elevated total colour difference (ΔE) values, regardless of the modification method. The sample modified with calcium hydroxide and dyed with the eco-carrier caffeine displays the highest ΔE value, while the sample modified with 1-pentanol shows the lowest.

The lightness difference (ΔL) is negative in all cases, indicating that all dyed samples are darker than the uncoloured reference. Under D65 illumination, ΔL values range from -15.43 to -18.23 for the respective treatments: calcium hydroxide, 1-pentanol, and 1-octanol.

The chroma (ΔC) and hue (ΔH) values provide additional insight into the tone and brilliance of the dyed samples. A positive ΔC reflects increased saturation, while ΔH describes tonal shifts between dyeing processes. The positive Δa values across all samples suggest an increased presence of red tones, whereas the positive Δb values confirm enhanced yellow tones and a reduction in blue hues.

Table 3. Colour differences of PES knit fabric (uncoloured/yellow-dyed sample)

Modified with $\text{Ca(OH)}_2\text{-H}_2\text{O}$ and dyed with DY54 + caffeine						
Light sources	ΔE	ΔL	Δa	Δb	ΔC	ΔH
D65	35.95	-15.43	7.78	31.53	32.04	5.30
A	38.60	-12.89	11.63	34.47	36.22	3.40
F02	38.18	-13.62	4.91	35.33	35.49	3.57
Modified with 1-pentanol and dyed with DY54 + caffeine						
Light sources	ΔE	ΔL	Δa	Δb	ΔC	ΔH
D65	28.55	-16.54	23.26	0.53	17.35	15.50
A	26.00	-13.81	20.96	6.77	19.07	11.02
F02	22.68	-14.94	16.93	2.09	11.87	12.25
Modified with 1-octanol and dyed with DY54 + caffeine						
Light sources	ΔE	ΔL	Δa	Δb	ΔC	ΔH
D65	32.59	-18.23	3.19	26.83	26.80	3.43
A	33.65	-16.41	7.05	28.52	29.30	2.15
F02	34.48	-16.91	1.78	30.00	29.96	2.36

The colour fastness of PES knit fabric was tested on all modified samples that underwent an identical dyeing procedure using the eco-carrier caffeine at 95°C for 60 minutes. Light fastness refers to the resistance of the dyed textile to the effects of daylight. Evaluation was conducted according to the relevant standard by comparing the degree of fading



(colour loss) between the tested textile and a standard, using a rating scale from 1 (very poor fastness) to 5 (very good fastness).

The best light fastness result for the yellow dye (Table 4) was achieved by the sample modified with 1-octanol, which received the maximum rating of 5. Slightly lower ratings of 4–5 were observed for the PES knit samples modified with $\text{Ca}(\text{OH})_2\text{-H}_2\text{O}$ and 1-pentanol, indicating very good but slightly less consistent resistance to light exposure.

In addition to light fastness, abrasion fastness was also evaluated for all dyed PES knit samples. This property indicates the resistance of the textile surface to mechanical wear during use, which is particularly important for clothing and technical textiles. The assessment was carried out using a standardised method, and the results are presented using a grading scale, where higher values indicate better abrasion resistance.

As shown in Table 4, the sample modified with 1-octanol again demonstrated the best performance, achieving a rating of 4, which suggests good resistance to wear. The samples modified with $\text{Ca}(\text{OH})_2\text{-H}_2\text{O}$ and 1-pentanol showed slightly lower abrasion fastness ratings of 3–4, indicating moderate to good resistance to mechanical stress. These results suggest that the type of modification agent can influence not only the colour properties but also the durability of the dyed fabric.

Table 4. Light fastness and abrasion fastness results of yellow-dyed PES knit fabric

Procedure designation	Light fastness	Abrasion fastness
$\text{Ca}(\text{OH})_2\text{-H}_2\text{O}$	4-5	3-4
1-Pentanol	4-5	3-4
1-Octanol	5	4

Colour fastness to washing was tested according to the prescribed standard by monitoring the transfer of colour from the dyed test specimen to adjacent white fabrics. Evaluation was carried out using the appropriate grey scales, such as the AATCC Gray Scale for Staining.

As shown in Table 5, all modified PES samples exhibited very good washing fastness, with ratings ranging from 4–5 to 5. The colour transfer to white polyester fabric consistently achieved the highest rating (5), while slightly lower or equal values were observed for white cotton fabric, indicating better fastness to polyester. These high ratings confirm the durability of the dyeing process for both tested colours.

Table 5. Colour fastness results of yellow-dyed PES knit fabric to washing (40 °C)

Procedure designation	Colour change of the test specimen	Colour transfer to white polyester fabric	Colour transfer to white cotton fabric
$\text{Ca}(\text{OH})_2\text{-H}_2\text{O}$	4-5	5	4-5
1-Pentanol	4-5	5	4-5
1-Octanol	4-5	5	5

Colour fastness to seawater refers to the resistance of textile dyes to the effects of salty seawater. To assess changes in colouration, a grey scale is used, along with a grey scale for evaluating colour transfer to white fabrics (both white polyester and white cotton). In the context of colour transfer to white fabric, a rating of 5 means no staining



occurred (i.e., no colour transfer), while a rating of 1 indicates significant staining and noticeable colour transfer.

The highest seawater fastness was observed in the samples modified with calcium hydroxide and 1-octanol, as shown in Table 6. Although there are differences between the samples, the ratings are generally close, mostly differing by half a point to one point. Colour transfer to white cotton fabric received better ratings compared to the transfer to white polyester fabric.

Table 6. Results of the colour fastness of yellow-dyed PES knitted fabric to seawater

Procedure designation	Change in colour of the sample	Colour transfer to white polyester fabric	Colour transfer to white cotton fabric
Ca(OH) ₂ -H ₂ O	4-5	5	4-5
1-Pentanol	4	4	4-5
1-Octanol	4-5	5	4-5

Colour fastness to water refers to the resistance of a textile's colouration to the effects of water exposure. Testing was conducted according to the standard procedure, following a similar method used for assessing colour fastness to seawater.

For the modified samples, colour fastness values ranged from 4 to 5. The best results (Table 7) were predominantly observed in the sample modified with 1-octanol, followed by the sample modified with Ca(OH)₂-H₂O, and lastly by the one modified with 1-pentanol.

Table 7. Results of the colour fastness of yellow-dyed PES knit to water

Procedure designation	Change in colour of the test solution	Colour transfer to white fabric	Colour transfer to white cotton fabric
Ca(OH) ₂ -H ₂ O	5	4-5	4-5
1-Pentanol	4	4-5	4
1-Octanol	4-5	5	5

Testing of colour fastness to water droplets was conducted according to the relevant standard, with evaluation performed after drying at room temperature. The colour change was assessed using a gray scale. This test measures the resistance of the textile's colouration to the impact of water droplets and is rated on a scale from 1 (significant change) to 5 (no visible change).

The obtained results (Table 8) show that the highest fastness to water droplets was recorded for the samples modified with Ca(OH)₂-H₂O and 1-octanol, followed by the sample modified with 1-pentanol, which received slightly lower ratings (4–5).

Table 8. Results of the Colour Fastness of Yellow-Dyed PES Knitted Fabric to Water Droplets

Procedure designation	Colour change 2 minutes after wetting	Colour change after drying the specimen
Ca(OH) ₂ -H ₂ O	2-3	4-5
1-Pentanol	2	4
1-Octanol	2-3	5



CONCLUSION

The results of this study showed that the chemical modification of PES knitted fabric using calcium hydroxide solution, as well as aliphatic alcohols (1-pentanol and 1-octanol), in combination with the environmentally friendly carrier caffeine, significantly affected the efficiency of the dyeing process with disperse dyes.

The best dyeing performance was achieved on the sample treated with $\text{Ca}(\text{OH})_2$ and dyed with the addition of caffeine, as confirmed by the high values of total colour difference ($\Delta E = 38.60$), colour saturation ($C = 41.78$), and pronounced hue ($b = 41.57$). This combination provided uniform colouration, good light fastness, and minimal dimensional changes in the material. The samples treated with alcohols showed more pronounced physical changes, particularly in thickness and mass loss, indicating a greater degree of surface modification. The use of caffeine as a natural carrier proved to be an effective and sustainable alternative to conventional toxic auxiliaries, allowing a reduction in dyeing temperature without compromising dyeing quality. In addition, the modified samples demonstrated satisfactory colour fastness properties, including resistance to washing, light, seawater, abrasion, and water droplets, which are essential for practical textile applications.

This study confirms that the combination of chemical modification and environmentally friendly additives can achieve satisfactory results in dyeing synthetic materials while preserving the environment and reducing energy consumption. Further research is recommended to evaluate the stability of these procedures under industrial conditions and to explore their application to various types of synthetic textiles.

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Izvod

BOJIVOST I POSTOJASNOST OBOJENJA POLIESTARSKJE PLETENINE POSLE PRETHODNE PRIPREME

**Marija Kodrić¹ [ID](#), Shahidul Islam² [ID](#), Zorica Eraković³ [ID](#), Predrag Tasić⁴ [ID](#),
 Dragan Đorđević³ [ID](#)**

¹ Inovacioni centar Univerziteta u Nišu, Niš, Srbija

² Katedra za tekstilni inženjering, BGMEA Univerzitet mode i tehnologije (BUFT), Daka, Bangladeš

³ Univerzitet u Nišu, Tehnološki fakultet u Leskovcu, Leskovac, Srbija

⁴ V.I. Vunil d.o.o, Leskovac, Srbija

U ovom radu je istražen uticaj prethodne pripreme poliestarske pletenine na efikasnost bojenja žutom disperznom bojom. Priprema sirove pletenine je urađena rastvorom alkalije (kalcijum-hidroksid), i čistim višim alkoholima (1-pentanol i 1-oktanol), dok je bojenje izvedeno u prisustvu ekološki pogodnog kerijera (kofein). Rezultati pokazuju da je prethodna priprema dovela do poboljšanja prijema boje tokom bojenja. Kao rezultat prethodne pripreme, značajan gubitak mase zabeležen je kod obrade sa 1-oktanolom (8,2%), što je dovelo do najvećeg bubrenja tkanine (povećanje debljine). Skupljanje je bilo ujednačeno kod svih uzoraka, u proseku oko 3%. Otpornost na pucanje prethodno obrađene pletenine je nešto slabija, posebno kod obrade alkalijom. Vrednosti parametara CIELab sistema pokazuju intenzivnije nijanse obojenja kod svih uzoraka, npr. uzorak posle modifikacije sa 1-oktanolom je najtamnije obojen. Uzorak prethodno



tretiran 1-oktanolom je najtamniji, što potvrđuje najveća zabeležena razlika u svetlini ($\Delta L = -18,23$). Pored toga, njegova visoka zasićenost boje ($C = 32,47$) i vrednost nijanse ($H = 86,23$) doprinose izraženoj žutoj boji sa visokom briljantnošću. Ovi CIELab parametri, zajedno sa subjektivnom procenom ujednačenosti boje, potvrđuju značajno bojenje i efikasnost ove modifikacije u postizanju intenzivnog i ujednačenog bojenja. Kofein se pokazao kao efikasan, netoksičan nosač, omogućavajući bolje rezultate bojenja nego postupci bez nosača ili oni sa konvencionalnim nosačem. Postojanost boje prethodno tretiranih poliesterskih pletenih tkanina na svetlost, pranje, trljanje, morsku vodu i kapi vode ocenjena je kao zadovoljavajuća i prihvatljiva.

Ključne reči: poliestar, prethodna priprema, bojenje, CIELab, postojanost boje.

