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(54) **Polyester/spandex elastic fabric dyeing method**

(57) A dyeing method for polyester/spandex elastic fabric includes dyeing and reduction rinsing processes; the dyeing process involving a chemical bath in a solution containing dispersing dye, ammonium acetate, and dyeing auxiliary at a given bath ratio and temperature; and the reduction rinsing process involving another chemical bath in solution containing sodium dithionite, sodium hy-

droxide, and rinse auxiliary at a given bath-ratio for the polyester to have better dyeing color under the low temperature dyeing conditions while allowing lighter dye absorption on the spandex; or better dye absorption for the spandex while delivering better color fastness to improve and upgrade color fastness, dyeing results, and quality.

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Description

BACKGROUND OF THE INVENTION

(a) Field of the Invention

[0001] The present invention is related to a dyeing method, and more particularly, to one a polyester/spandex elastic fabric dyeing process.

(b) Description of the Prior Art:

[0002] Whereas fabric containing polyester elastic fiber delivers better elasticity and excellent resilience, soft hand touch, comfortable to wear, and best showing off beautiful figures of body, it is expanding range of application. The production technology for the polyester/spandex compound fibers upgrades the regular product to the product with higher added value to see a greater potential of development for the polyester/spandex elastic fabric. However, to prevent properties of spandex from being compromised, the dyeing temperature for the polyester becomes a problem. Higher dyeing temperature is not applicable to polyester; and lower dyeing temperature using a dispersing dyestuff fails consistent and good penetration of dyestuff into the polyester. So far, the dyeing rate and upgrading rate of the construction of the polyester have not yet been well realized. Meanwhile, the unique construction of the spandex though makes it easily absorbs the dye, it also easily desorbs the dye, resulting in reduced color fastness of spandex products. Therefore to upgrade the overall quality of spandex product, it is important to develop a proper dyeing method to solve the problems.

SUMMARY OF THE INVENTION

[0003] The primary purpose of the present invention is to provide a dyeing method for polyester/spandex elastic fabric that delivers better dyeing results for polyester/spandex compositions under low temperature dyeing and better color fastness for the spandex.

[0004] To achieve the purpose, a dyeing method for polyester/spandex elastic fabric of the present invention is comprised of dyeing and reduction rinsing processes. The dyeing process involves a chemical bath in a solution containing dispersing dye, ammonium acetate, and dyeing auxiliary at a given bath ratio and temperature; and the reduction rinsing process involves another chemical bath in a solution containing sodium dithionite, sodium hydroxide, and rinse auxiliary at a given bath-ratio.

[0005] In the dyeing process, the ratio of the dispersing dye used in the bath is 0.1~5% of the weight of the fabric, 0.1~2g/L ammonium acetate for regulating pH, and 0.1~1g/L dyeing auxiliary at a bath ratio of 5:1~50:1 and a given temperature of 100~130°C while the solution used in the reduction rinsing process is comprised of 0.1~4g/L sodium dithionite, 0.1~3g/L sodium hydroxide,

and 0.1~3g/L rinse auxiliary at a bath ratio of 5:1~50:1.

[0006] The dispersing dye is related to a low temperature or moderate temperature dispersing dye.

[0007] The dyeing auxiliary is related to a dispersing leveling agent or a chelate dispersing agent.

[0008] The pH in the dyeing process is regulated to 4~6.

[0009] The rinse auxiliary used in the reduction rinsing process is essentially related to a rinse auxiliary of surface active agent, e.g., soaping agent, pro-grill cleaner, or chemical reducing agent.

[0010] Both of the polyester and the spandex are of hydrophobia fibers and both can take dispersing dyes, but different in affinity to the dispersing dye since internal chemical composition and microstructure in both fibers are different, meaning each has its specific characteristics in taking the dyes. In the phase of low temperature, the dispersing dye is essentially absorbed by the composition of spandex; and one the temperature rises up to 110°C the dye absorption rate of the spandex starts to descend and the dye absorption is transferred to the composition of polyester so that the dye absorption rate of the polyester composition gradually increases; and when the temperature further rises up to 130°C the conversion of dye absorption from spandex to polyester continues until finally a balanced status is achieved.

[0011] The construction feature of the spandex makes it easy to absorb the dispersing dye indicating a higher dyeing rate though the spandex constitutes only a small proportion (10%) in the elastic fabric. However, when the temperature is maintained at 130°C for forty minutes, the dyeing rate of absorbing the dispersing dye on the spandex composition is approximately of 0.5 indicating comparatively higher dye absorption, which can be easily desorbed in the rinsing process resulting in degraded quality of color fastness.

[0012] Affinity and dyeing absorption characteristics of polyester and spandex vary depending on the type of dispersing dye used because that chemical structure differs among dispersing dye. To upgrade the quality of color fastness of the fabric, a lower temperature and a moderate temperature disperse dyes having lighter absorption by the spandex composition are selected in the present invention.

[0013] Absorption of the dispersing dye by both compositions of polyester and spandex is also affected to a certain extent by the surface active agent and carrier. Addition of a certain auxiliary may increase the absorption of dye by spandex composition while addition of other auxiliary may discourage the absorption of dye by spandex composition. The auxiliary used in the present invention reduces the dyeing temperature of the polyester and spandex blended fibers fabric to protect the properties of the spandex from being damaged on one hand; and reduce the attachment of dye to spandex to upgrade the quality of color fastness of the fabric.

[0014] The reduction rinse effectively reduce the attachment of dye on the spandex composition to promote

desorbing the dispersing dye on the spandex and to migrate to reduction rinsing liquid on one hand; and to prevent reattachment of the dispersing dye in the rinsing liquid to the spandex on the other hand.

[0015] The present invention therefore provides the benefits of causing the polyester to have better dyeing color under the low temperature dyeing conditions while allowing lighter dye absorption on the spandex; in other words, the present invention provides better dye absorption for the spandex while delivering better color fastness to improve and upgrade color fastness, dyeing results, and quality. The resultant color fastness of the product is Grade 4~5 of changed color in soaping; Grade 4 color fastness in soaping attachment; and Grade 4~5 color fastness to sunlight; elastic return force loss less than 4.3%; and braking strength of 2420N warpwise and 1710N fillingwise. No additional influence of waste water in the production process and all auxiliaries used in the process are environmental friendly. The process of the present invention will not produce new pollutant to the environment since most of any additional auxiliary used are attached to the fibers leaving only a small amount of residual auxiliary in the water.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Preferred Embodiment

[0016] A polyester/spandex elastic fabric dyeing method is comprised of a dyeing process and a reduction rinsing process. The dyeing process involves a chemical bath in a solution containing a low temperature dispersing dye in an amount of 0.1 % of the weight of the fabric, 2g/L ammonium acetate to regulate pH of the solution to 4, and 0.1g/L dispersing leveling agent as a dyeing auxiliary in a bath ratio of 50:1 and a temperature of 100°C; and the reduction rinsing process involves another chemical bath in a solution containing 3g/L sodium dithionite, 0.1g/L sodium hydroxide, and 0.1g/L of soaping agent as a rinsing auxiliary in a bath ratio of 5:1 to complete the dyeing of polyester/spandex elastic fabric.

Second Preferred Embodiment

[0017] A polyester/spandex elastic fabric dyeing method is comprised of a dyeing process and a reduction rinsing process. The dyeing process involves a chemical bath in a solution containing a moderate temperature dispersing dye in an amount of 3% of the weight of the fabric, 1g/L ammonium acetate to regulate pH of the solution to 4.5, and 2g/L chelate dispersing agent as a dyeing auxiliary in a bath ratio of 15:1 and a temperature of 115°C; and the reduction rinsing process involves another chemical bath in a solution containing 2g/L sodium dithionite, 2g/L sodium hydroxide, and 1g/L of chemical reducing agent as a rinsing auxiliary in a bath ratio of 15:1 to complete the dyeing of polyester/spandex elastic fabric.

Third Preferred Embodiment

[0018] A polyester/spandex elastic fabric dyeing method is comprised of a dyeing process and a reduction rinsing process. The dyeing process involves a chemical bath in a solution containing a moderate temperature dispersing dye in an amount of 5% of the weight of the fabric, 0.1g/L ammonium acetate to regulate pH of the solution to 6, and 2g/L dispersing leveling agent as a dyeing auxiliary in a bath ratio of 5:1 and a temperature of 130°C; and the reduction rinsing process involves another chemical bath in a solution containing 0.1g/L sodium dithionite, 3g/L sodium hydroxide, and 3g/L of pro-grill detergent as a rinsing auxiliary in a bath ratio of 50:1 to complete the dyeing of polyester/spandex elastic fabric.

Claims

1. A dyeing method for polyester/spandex elastic fabric is comprised of dyeing and reduction rinsing processes; the dyeing process involving a chemical bath in a solution containing dispersing dye, ammonium acetate, and dyeing auxiliary at a given bath ratio and temperature; and the reduction rinsing process involving another chemical bath in solution containing sodium dithionite, sodium hydroxide, and rinse auxiliary at a given bath-ratio.
2. The dyeing method for polyester/spandex elastic fabric as claimed in Claim 1, wherein for the dyeing process, the ratio of the dispersing dye used in the bath is 0.1~5% of the weight of the fabric, 0.1~2g/L ammonium acetate for regulating pH, and 0.1~1g/L dyeing auxiliary at a bath ratio of 5:1~50:1 and a given temperature of 100~130°C ; and the solution used in the reduction rinsing process is comprised of 0.1~4g/L sodium dithionite, 0.1~3g/L sodium hydroxide, and 0.1~3g/L rinse auxiliary at a bath ratio of 5:1~50:1.
3. The dyeing method for polyester/spandex elastic fabric as claimed in Claim 2, wherein the dispersing dye is related to a low temperature or moderate temperature dispersing dye.
4. The dyeing method for polyester/spandex elastic fabric as claimed in Claim 2, wherein the dyeing auxiliary is related to a dispersing leveling agent or a chelate dispersing agent
5. The dyeing method for polyester/spandex elastic fabric as claimed in Claim 2, wherein the pH in the dyeing process is regulated to 4~6.
6. The dyeing method for polyester/spandex elastic fabric as claimed in Claim 2, wherein the rinse auxiliary used in the reduction rinsing process is essen-

tially related to a rinse auxiliary of surface active agent, e.g., soaping agent, pro-grill cleaner, or chemical reducing agent.

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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 12 2687

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2007/053160 A (INVISTA TECH SARL [US]; CHUANG CHENG-YUAN [CN]; LAYCOCK GRAHAM H [SG];) 10 May 2007 (2007-05-10) * page 3, line 15 - line 21 *	1-6	INV. D06P1/66 D06P1/673 D06P3/54 D06P3/82
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Place of search		Date of completion of the search	Examiner
Munich		31 March 2008	Koegler-Hoffmann, S
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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31-03-2008

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