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(54) Title: LIGHT-FAST DYEINGS ON BICOMPONENT FIBRES

(57) Abstract: Process for improving the light-fastness of dyeings on multicomponent fibres composed of a thermodynamically compatible polyolefin and polyamide with disperse dyes characterized in that they are subjected to a treatment with benzotriazole derivatives.



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LIGHT-FAST DYEINGS ON BICOMPONENT FIBRES

This invention relates to a process for dyeing multicomponent fibres especially for dyeing bi- and tricomponent fibres, the dyeings being notable for excellent light-fastness. This invention
5 further also relates to the light-fast multicomponent fibres dyed thereby.

Unmodified polyolefin fibres, especially polypropylene (PP) fibres, are dyeable with the usual disperse dyes only in extremely pale shades having very low fastnesses. Prior art ways to improve dyeability include, on the one hand, chemically modifying polyolefin fibres
10 (especially polypropylene (PP) fibres) and on the other to use modified or newly synthesized dyes.

JP 10-331034 relates to a fiber having excellent moisture absorbing and releasing property and suitable as a fiber for textile improved in heat resistance and light resistance of the fiber
15 itself by including a specific amount of phenolic antioxidant in a core component and including a specific amount of benzotriazole-based ultraviolet light absorbent in a sheath component. Nothing is disclosed about light fast dyeings on bicomponent fibers.

EP445076 relates to stable dispersions of benzotriazole ultraviolet (U.V.) absorbing agents
20 utilizing modified ligninsulfonates as the dispersing agent, a method of dispersing the benzotriazole U.V. absorbing agents, a method of protecting textiles by utilizing the stable dispersions and textiles treated with the stable dispersions avoiding that any undispersed U.V. absorbing agent is filtered out, producing deposits. Nothing is disclosed about light fast dyeings on bicomponent fibers.

EP474595 relates to stable aqueous dispersions of UV-absorbing benzotriazole compounds wherein these dispersions are excellent compositions for improving the light fastness of dyeings on synthetic fibres, in particular polyester fibres or acid-modified polyester fibres. However, nothing is disclosed about light fast dyeings on bicomponent fibers.

US5221287 relates to a process for the photochemical and thermal stabilization of polyamide fibres having an affinity for acid and basic dyes, and of blends of said fibres with one another

and with other fibres. However, nothing is disclosed about light fast dyeings on bicomponent fibers.

5 It has now emerged that suitable process management and suitable dispersions of dyes which can also be used for dyeing polyester fibres make it possible to obtain good light-fast dyeing results if the dyeing is additionally treated, the treatment being effected with benzotriazole derivatives in particular.

10 It has now been found that the dyeings of multicomponent fibres especially after the dyeing of bicomponent fibres composed of a thermodynamically compatible polyolefin and polyamide with disperse dyes have a high light-fastness when the multicomponent fibres are subjected to treatment with benzotriazole derivatives.

15 This invention further also relates to the light-fast multicomponent fibres dyed by the process of the present invention.

This invention also relates to the use of benzotriazole derivatives for enhancing the light-fastness of dyed multicomponent fibres especially after the dyeing of bicomponent fibres composed of a thermodynamically compatible polyolefin and polyamide.

20

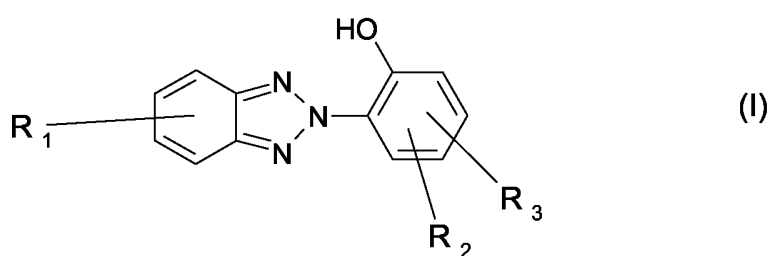
The multicomponent fibres according to the invention are side-by-side fibres (the two or more different polymers are side by side without being a blend nor in a different fibre - thus bonded together and therefore forming a single fibre), sheath-core fibres (a first polymer forms a core portion and a second polymer forms a sheath around the first polymer, and optionally further 25 polymers form a sheath around the inner core-and-sheath-structure) or islands-in-a-sea (multiple core portions of a first polymer are surrounded by a second sheath polymer) fibres. The sheath-core fibres and the islands-in-a-sea fibres are the preferred multicomponent fibres, while the sheath-core fibres are the even more preferred fibres. In the preferred sheath-core fibres the sheath is arranged concentrically around the core portion.

30

Preferred multicomponent fibres especially bicomponent fibres consist of a thermodynamically compatible polyolefin and polyamide, in particular of polypropylene, modified polyamide (PA) and polyamide.

Preferred multicomponent fibres or to be more precise bicomponent fibres have a polyfilamentary character.

- 5 More preferred multicomponent fibres especially bicomponent fibres consist of a core of one polymer (preferably the polyamide) which is sheathed by the other polymer (preferably by the polyolefin). The fibres composed of a thermodynamically compatible of polypropylene and polyamide, especially polypropylene and nylon 6 (PP/N6), are produced by conventional spinning processes such that fine filaments of one polymer (preferably polyamide) are formed
- 10 in the matrix of the other polymer (preferably the polyolefin). When two melts are fed simultaneously to a spinneret hole results a bicomponent filament is resulting. Spinnerets with two concentric holes yield sheath-core filaments (bicomponent sheath-core fibres) from two melts.
- 15 To improve the adhesion between the PA and the PP it is possible to utilize ionomer (IM), maleic anhydride or alternatively a polyester. These agents for enhancing the compatibility between the various components may be present in amounts of up to 10 per cent by weight, but preferably from 3 to 8 per cent by weight.
- 20 The preferred multicomponent fibres especially bicomponent fibres according to the invention are dyed in the one component and the benzotriazole derivatives are applied in the other portion of the multicomponent fibre or bicomponent fibres. The dyestuff and the benzotriazole derivative are not located in the same component of the multicomponent fibres.
- 25 The preferred multicomponent fibres especially bicomponent fibres according to the invention are dyed in the core portion and the benzotriazole derivatives are applied in the sheath portion of the multicomponent fibre or bicomponent fibres. The preferred multicomponent fibres according to the invention are bicomponent fibres.
- 30 Preferred benzotriazole derivatives are benzotriazole derivatives of the formula (I)



where

R₁ is a halogen atom,

R₂ is a C₁ to C₆ alkyl, and

5 R₃ is a C₁ to C₆ alkyl.

Preferably R₃ is a branched C₃ to C₆ hydrocarbyl radical.

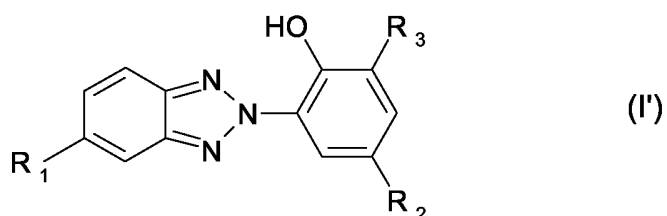
In a preferred benzotriazole of the formula (I)

R₁ is chlorine or fluorine,

10 R₂ is a methyl, ethyl or propyl, and

R₃ is a methyl, ethyl or propyl, isopropyl or tertiary butyl.

Very particularly preferred benzotriazoles of the formula (I) have the formula (I')



15 where

R₁ is a halogen atom,

R₂ is a C₁ to C₆ alkyl, and

R₃ is a C₁ to C₆ alkyl.

20 In a preferred benzotriazole of the formula (I')

R₁ is chlorine or fluorine,

R₂ is a methyl, ethyl or propyl, and

R₃ is a methyl, ethyl or propyl, isopropyl, tertiary butyl.

25 Very particular preference is given to the benzotriazole derivative of the formula (I') wherein

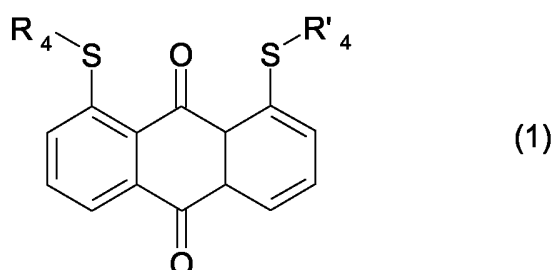
R₁ is chlorine, R₂ is methyl and R₃ is tertiary butyl.

The benzotriazole derivative is used in an amount of 0.01 to 20 per cent by weight based on the dry material preferably 0.01 especially 0.1 to 15 per cent by weight based on the dry material, but in particular 0.1 to 10 per cent by weight based on the dry material in the process of the present invention.

The treatment with the benzotriazole derivative can take place after the dyeing or else concurrently during the dyeing. Dyeing for the purposes of the present invention includes printing.

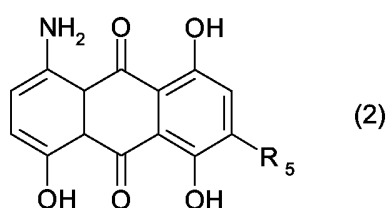
Disperse dyes for the process of the present invention are those which are customarily also used for dyeing polyester materials, but have high light-fastnesses on polyamide too.

Preferred disperse dyes for the process of the present invention are disperse dyes having the formulae (1)

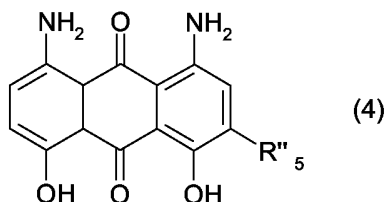
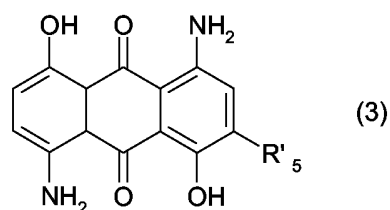


where R_4 and R'_4 are independently a phenyl group or a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH.

More preferred disperse dyes for the process of the present invention are disperse dyes having the formulae (2), (3) or (4)

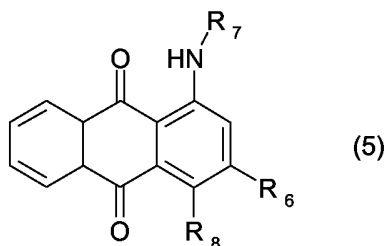


6



where R_5 , R'_5 , and R''_5 are independently halogen, in particular -Cl or -Br, a phenyl group or
 5 a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃,
 -OCH₂CH₃ or -OH.

More preferred disperse dyes for the process of the present invention are disperse dyes having
 the formulae (5)



where

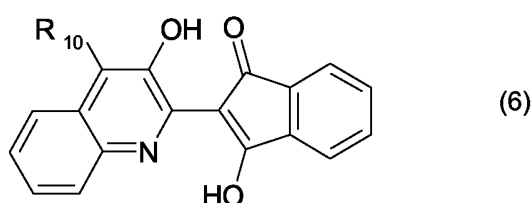
R_6 is halogen, in particular -Cl or -Br, a phenyl group or a phenyl group substituted
 15 by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,
 or a phenyl group or a phenoxy group substituted by halogen, in particular -Cl or -
 Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,

R_7 is a phenyl group or a phenyl group substituted by halogen, in particular -Cl or -
 Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,

20 R_8 is -NH₂ or -NHR₉, where R_9 is halogen, in particular -Cl or -Br, a phenyl group or
 a phenyl group or phenoxy group substituted by halogen, in particular -Cl or -Br, -
 CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH, or a phenyl group or a phenoxy
 group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -

OCH₂CH₃ or -OH, or R₉ is a group of the formula SO₂-phenyl, where the phenyl group of the SO₂-phenyl group is not substituted, or is a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH, or is a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH.

More preferred disperse dyes for the process of the present invention are disperse dyes having the formulae (6)



where

R₁₀ is -H or halogen, in particular -H, -Cl or Br.

Very particularly suitable disperse dyes of the formulae (1), (2), (3), (4), (5) or (6) for the process of the present invention are C. I. Disperse Orange 41 and/or C. I. Disperse Orange 41:1 and/or C. I. Disperse Violet 36 and/or C. I. Solvent Yellow 163 and/or C. I. Disperse Blue 73 and/or C. I. Disperse Blue 56 and/or C. I. Disperse Red 86 and/or C. I. Disperse Red 60 and/or C. I. Disperse Violet 27 and/or C. I. Disperse Yellow 64 and/or C. I. Disperse Yellow 54.

These dyes of the formulae (1), (2), (3), (4), (5) or (6) can be used alone or as mixtures comprising one of the abovementioned disperse dyes in the process of the present invention.

The dyeing or printing in the process of the present invention is done in accordance with processes known per se, for example the processes described in French Patent No. 1 445 371. The customary dyeing processes whereby the processes of the present invention can be dyed and/or printed with disperse dyes are also described for example in M. Peter and H.K. Rouette: "Grundlagen der Textilveredelung; Handbuch der Technologie, Verfahren und Maschinen", thirteenth, revised edition, 1989, Deutscher Fachverlag GmbH, Frankfurt/Main,

Germany, ISBN 3-87150-277-4, in which the following pages are particularly relevant: the pages 460-461, 482-495, 556-566 and 574-587. Possibilities for mats and carpets include the continuous or batch dyeing process and also the contactless dyeing or the classic printing or spraying of the dyes or formulations of the dyes by the ChromoJet process or other processes

5 (M. Peter and H.K. Rouette: "Grundlagen der Textilveredelung; Handbuch der Technologie, Verfahren und Maschinen", thirteenth, revised edition, 1989, Deutscher Fachverlag GmbH, Frankfurt/Main, Germany, ISBN 3-87150-277-4, pages 484 to 492 (chapter 7.221.1) and page 846 and Figure 8.70).

- 10 The dyeings obtained have good all-round fastnesses; to be mentioned in particular are the light-fastness, fastness to heat setting and pleating and also the excellent wet-fastnesses, after thermal stabilization (thermomigration-fastness), but in particular the high light-fastness.

The textile material mentioned may be present in the various processing forms, for example

15 as fibre, yarn or web, as a woven or loop-formingly knitted fabric or in the form of carpets. These textiles find utility in the automotive sector or generally in transit engineering such as rail, aeroplanes and/or trams, in the technology of built structures or to be more precise in or on built structures and/or in the leisure sector.

- 20 The disperse dyes are applied to the textile materials by known dyeing processes. For example, polyolefin-polyamide multicomponent fibres or bicomponent fibre materials are exhaust dyed from an aqueous dispersion in the presence of anionic or nonionic dispersants with or without customary carriers at temperatures between 70 and 140°C.

- 25 Fibre materials based on polyolefin-polyamide are preferably dyed at a pH of 3 to 7, and especially 3 to 6. The dyeing temperature is preferably in the range from 70 to 110°C, and especially in the range from 80 to 105°C.

The liquor ratio depends on the apparatus, the substrate and the make-up form. However, the

30 liquor ratio can be chosen within a wide range, for example from 4 : 1 to 100 : 1 and preferably from 5 : 1 to 30 : 1.

The disperse dyes used according to the present invention can be applied in the customary dyeing processes, such as for example in the exhaust process, in the continuous process, in the printing process or in non-impact printing processes such as for example inkjet or the spray pressure/Chromojet particularly suitable for carpets.

5

The disperse dyes used according to the present invention are also suitable for dyeing from short liquors, as for example in continuous dyeing processes or batch and continuous foam dyeing processes.

- 10 The dyeing liquors or printing pastes, in addition to water and the dyes, may contain further additives, for example wetting agents, antifoams, levelling agents or agents to influence the properties of the textile material, for example fabric softeners, flame retardants or soil, water and oil repellents and also water softeners and natural or synthetic thickeners, examples being alginates and cellulose ethers.

15

The amounts in which the disperse dyes are used in the dyebaths or printing pastes can vary within wide limits depending on the desired depth of shade. Advantageous amounts will generally be in the range from 0.01% (0.001% to 20% by weight) to 15% by weight and especially 0.1% to 10% by weight, based respectively on weight of fibre and the printing
20 paste.

The various dyeing and printing processes for carpets are preferably carried out as follows:

A liquor of the following composition is prepared for the continuous process:

- | | | | |
|----|------------|-----|--|
| 25 | 0.001 - 30 | g/l | of disperse dyes |
| | 1 - 15 | g/l | of thickener, e.g. Polyprint M225, polysaccharide, guar, tamarind |
| | 0.1 - 10 | g/l | of wetting and anti-frosting agents, e.g. Sandogen WAF liq., Sandogen AFB liq. |
| | 0.1 - 10 | g/l | of an acid donor, e.g. Sandacid VS liq., Sandacid VAN liq. |
| 30 | 0.1 - 10 | g/l | of buffer systems, for example Sandacid PB liq., Sandacid PBBK liq. |
| | 0.1 - 30 | g/l | of benzotriazole derivatives of the formula (I). |

The material to be dyed is padded in a pad-mangle to a wet pick-up of 100 - 600% preferably 400% and fixed for 8 min in hot saturated steam at around 102°C for 2 - 20 min; alternatively, fixing can also be effected with dry heat or superheated steam during the period indicated above. Thereafter, the material is rinsed with cold water and if appropriate further treated or
 5 further processed as customary in the industry.

A liquor of the following composition is prepared for the exhaust process:

	0.001 – 20	%	of disperse dyes
	0.1 – 10	ml/l	of dispersant, e.g. Lyocol RDN liq., Lyocol OU liq.
10	0.1 – 5	g/l	of ammonium sulphate
	0.1 – 30	g/l	of benzotriazole derivatives of the formula (I).

The pH is adjusted to a value of 3 - 7 and preferably to a pH of 4.5 - 6. It is dyed at 70 - 140°C for 30 to 90 min and then rinsed with water and is if appropriate further treated or
 15 further processed as customary in the industry.

A printing paste of the following composition is prepared for the non-impact printing process:

	0.001 – 30	g/kg	of disperse dyes
	2 – 20	g/kg	of synthetic thickener, e.g. Tanaprint ST 160, Prisulon 200, Texipol
20		675031	
	0.1 – 10	g/kg	of dispersing, wetting, anti-frosting agent, e.g. Sandogen WAF liq., Sandogen AFB liq., Tanaspers CF liq.
	0.1 – 10	g/kg	of acid for pH adjustment, e.g. citric acid
	0.1 – 10	g/kg	of defoamer, for example Nofome 1125 liq., Antimussol UP liq.,
25			Antimussol SF liq.
	0.1 – 30	g/l	of benzotriazole derivatives of the formula (I).

The material to be printed in a non-impact printing process is sprayed with the printing paste to a pick-up of 100 - 600% and preferably 300% based on the dry weight of the material to be
 30 printed and the material is fixed with hot saturated steam at 102°C for 2 to 20 min (preferably 8 min), although dry heat or superheated steam can alternatively be used for fixing. Thereafter, the material is rinsed with cold water and is if appropriate further treated or further processed as customary in the industry.

Industry-customary further treatments or further processing operations may comprise finishing with fluorinated chemicals, other soil- and/or water-repellant chemicals and/or the application of a carpet backing.

5

The examples which follow illustrated the invention. Percentages are by weight unless stated otherwise.

Examples:

10

The dyeing examples utilized small pieces of carpet produced from a bicomponent fibre (PP/PA) from Aquafil Textile Yarns S.p.A., Via Parma, 45, IT - 46041 Asola - Mantova (Italy).

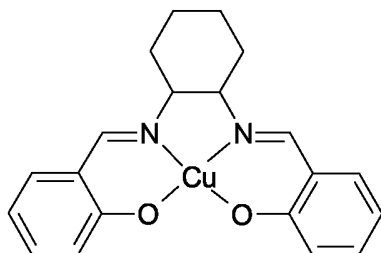
15 Example 1 (not according to invention)

Small pieces of carpet are padded in a pad-mangle in a bath containing 0.25 g/l of C.I. Solvent Yellow 163, 0.06 g/l of C.I. Disperse Red 86 and 0.009 g/l of C.I. Disperse Blue 73, 100 g/l of a 3.5% solution of Polyprint M225, 3 g/l of Sandogen WAF liq., 2 g/l of Sandacid VS liq., and sufficient Sandacid PB liq. for a bath pH of 5 to a wet pick-up of 400% (based on the dry weight), and the piece of carpet thus impregnated is fixed for 8 minutes in hot saturated steam at 102°C and subsequently washed with cold water. A beige dyeing was obtained on the piece of carpet. The piece of carpet thus obtained was tested for light-fastness (see hereinbelow).

20

Example 2 (not according to invention)

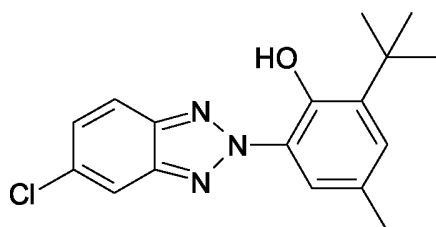
25 Small pieces of carpet are dyed as in Example 1, but the bath additionally contained 5 g/l of a 10% suspension of a compound of the formula



A beige dyeing was obtained in the piece of carpet. The piece of carpet thus obtained was tested for light-fastness (see hereinbelow).

Example 3

Small pieces of carpet are dyed as in Example 1, but the bath additionally contained 5 g/l of a 25% suspension of a compound of the formula

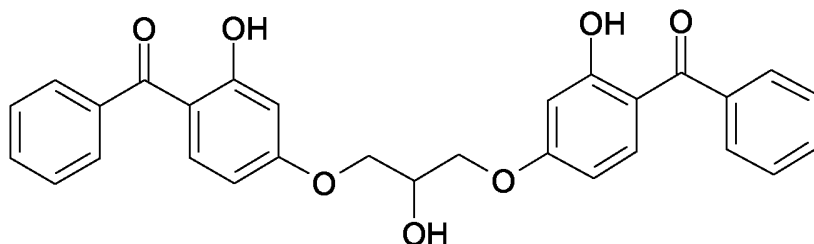


5

A beige dyeing was obtained in the piece of carpet. The piece of carpet thus obtained was tested for light-fastness (see hereinbelow).

Example 4 (not according to invention)

- 10 Small pieces of carpet are dyed as in Example 1, but the bath additionally contained 5 g/l of a 20% suspension of a compound of the formula

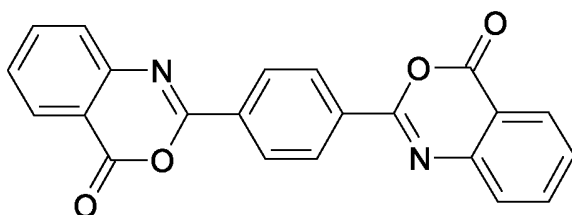


A beige dyeing was obtained in the piece of carpet. The piece of carpet thus obtained was tested for light-fastness (see hereinbelow).

15

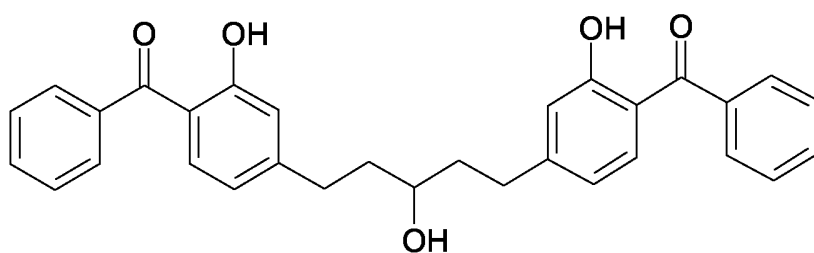
Example 5 (not according to invention)

Small pieces of carpet are dyed as in Example 1, but the bath additionally contained 5 g/l of a suspension of 35 parts of a compound of the formula



- 20 and 35 parts of a compound of the formula

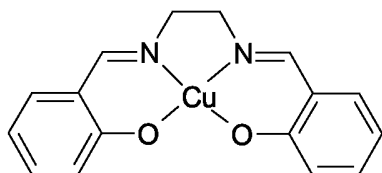
13



A beige dyeing was obtained in the piece of carpet. The piece of carpet thus obtained was tested for light-fastness (see hereinbelow).

5 **Example 6 (not according to invention)**

Small pieces of carpet are dyed as in Example 1, but the bath additionally contained 5 g/l of a 10% suspension of a compound of the formula



10 A beige dyeing was obtained in the piece of carpet. The piece of carpet thus obtained was tested for light-fastness (see hereinbelow).

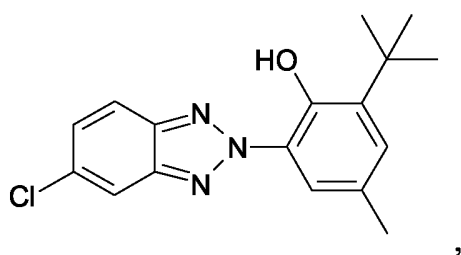
Measurement of light-fastness of Examples 1 to 7

15 Light-fastness was measured according to ISO 105 Method 2. A sample of the piece of carpet to be tested is exposed, half-covered, to light together with the blue light-fastness standards, which are pieces of wool cloth. Colour fastness is assessed by comparing the change in colour of the specimen with the change in colour of the light-fastness standards used. The specimen is exposed to a certain amount of light energy and the assessment was made not against the eight-step blue scale but against the five-step grey scale. This resulted in a colour fastness to
20 light rating of 1 – 5.

Example	Grey scale at exposure step BT6=GS4	Grey scale at exposure step BT6=GS3-4
1	2.1	1.2
2	2.8	1.2
3	3.6	2.7
4	2.1	1.5
5	1.6	1.2
6	2.3	1.2

Example 8

- 5 Small pieces of carpet are padded in a pad-mangle in a bath containing 0.30 g/l of C. I. Disperse Blue 73, 100 g/l of a 3.5% solution of Polyprint M225, 3 g/l of Sandogen WAF liq., 5 g/l of a 25% suspension of a compound of the formula



- 2 g/l of Sandacid VS liq. and sufficient Sandacid PB liq. for a bath pH of 5 to a wet pick-up of
 10 400% (based on the dry weight), and the piece of carpet thus impregnated was fixed for 8 minutes in hot saturated steam at 102°C and subsequently washed with cold water to obtain a piece of carpet having a reddish yellow colour of very good light-fastness.

Examples 9 to 16

- 15 Small pieces of carpet are dyed as in Example 8, but instead of the 0.30 g/l of C.I. Disperse Blue 73 the bath contained 0.32 g/l of the following dye (F):

Example	Dye (F)	Colour of dyed piece of carpet
9	C. I. Solvent Yellow 163	reddish yellow
10	C. I. Disperse Blue 73	pale blue
11	C. I. Disperse Blue 56	blue

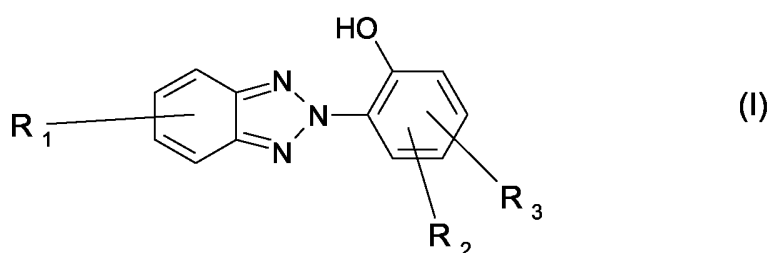
12	C. I. Disperse Red 86	pink
13	C. I. Disperse Red 60	bluish red
14	C. I. Disperse Violet 27	reddish violet
15	C. I. Disperse Yellow 64	pale yellow
16	C. I. Disperse Yellow 54	pale yellow

Pieces of carpet coloured in the stated colour and having very good light-fastness were obtained.

Claims

1. Process for improving the light-fastness of dyeings on multicomponent fibres composed of a thermodynamically compatible polyolefin and polyamide with disperse dyes characterized in that the multicomponent fibres are subjected to a treatment with benzotriazole derivatives.

2. Process according to Claim 1 characterized in that the benzotriazole derivatives are benzotriazole derivatives of the formula (I)



where

R₁ is a halogen atom,

R₂ is a C₁ to C₆ alkyl, and

R₃ is a C₁ to C₆ alkyl.

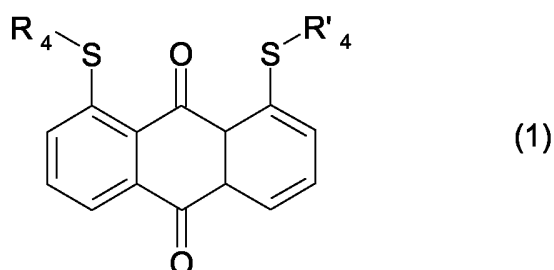
3. Process according to Claim 1 characterized in that the multicomponent fibres consist of a thermodynamically compatible polyolefin and polyamide, in particular of polypropylene, modified PA and polyamide, and preferably have polyfilamentary character.

4. Process according to claim 1 characterized in that the multicomponent fibres consist of a core of a first polymer, which preferably is the polyamide, and in that this core is sheathed by a second polymer, which is preferably the polyolefin.

5. Process according to Claim 1 characterized in that the benzotriazole derivative is used in an amount of 0.01 to 20 per cent by weight based on the dry material.

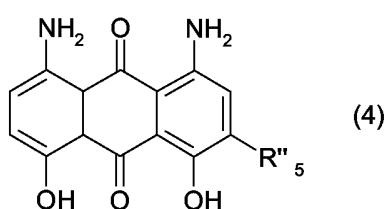
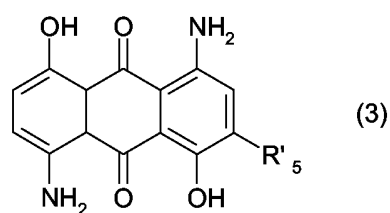
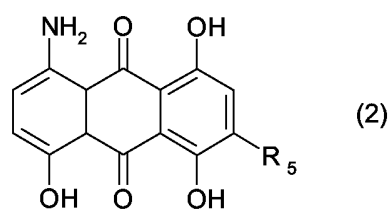
6. Process according to Claim 1 characterized in that the disperse dyes have the formulae (1)

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where R_4 and R'_4 are independently a phenyl group or a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,

5 or the formulae (2), (3) or (4)

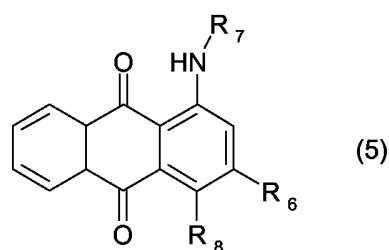


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where R_5 , R'_5 , and R''_5 are independently halogen, in particular -Cl or -Br, a phenyl group or a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,

15 or have the formulae (5)

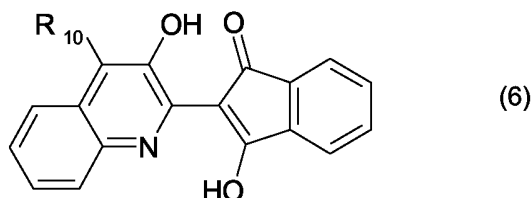
18



where

- 5 R_6 is halogen, in particular -Cl or -Br, a phenyl group or a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH, or a phenyl group or a phenoxy group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,
- R_7 is a phenyl group or a phenyl group substituted by halogen, in particular -Cl or Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,
- 10 R_8 is -NH₂ or -NHR₉, where R₉ is halogen, in particular -Cl or -Br, a phenyl group or a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH, or a phenyl group or a phenoxy group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH, or R₉ is a group of the formula SO₂-phenyl, where the phenyl group of the SO₂-phenyl group is not substituted, or is a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH, or is a phenyl group substituted by halogen, in particular -Cl or -Br, -CH₃, -CH₂CH₃, -OCH₃, -OCH₂CH₃ or -OH,
- 15

20 or have the formulae (6)



where

- 25 R_{10} is -H or halogen, in particular -H, -Cl or Br.

7. Light-fast dyed multicomponent fibres composed of a thermodynamically compatible polyolefin and polyamide dyed with disperse dyes characterized in that they have been subjected to a treatment with benzotriazole derivatives.

5 8. Use of light-fast dyed multicomponent fibres according to Claim 7 for producing carpets and/or textile floorcoverings.

9. Use of benzotriazole derivatives for treating multicomponent fibres composed of a thermodynamically compatible polyolefin and polyamide.

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10. Use of benzotriazole derivatives according to Claim 9 for enhancing the light-fastness of dyed multicomponent fibres composed of a thermodynamically compatible polyolefin and polyamide.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/060718

A. CLASSIFICATION OF SUBJECT MATTER

INV. D06P1/642 D06P3/82 D06P3/00 D06P3/24 D06P3/26
D06P3/79

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 03, 31 March 1999 (1999-03-31) & JP 10 331034 A (UNITIKA LTD), 15 December 1998 (1998-12-15) abstract	1
A	EP 0 445 076 A (CIBA-GEIGY AG) 4 September 1991 (1991-09-04) the whole document	1-10
A	EP 0 474 595 A (CIBA-GEIGY AG) 11 March 1992 (1992-03-11) page 17, line 46 - page 18, line 15; claims 32,33	9
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

29 May 2006

Date of mailing of the international search report

06/06/2006

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/060718

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 221 287 A (REINERT ET AL) 22 June 1993 (1993-06-22) column 1, line 29 - line 39; claims 7-9; example 7 -----	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2006/060718

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