

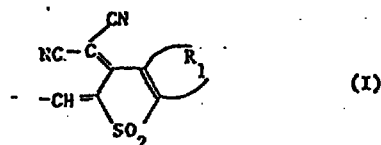
SPECIFICATION

Dicyanomethylidene-dihydrothiophene dioxide derivatives

- 5 The present invention relates to disperse dyestuffs which are 3-dicyanomethylidene 2,3-dihydrothiophene 1,1-dioxide derivatives. 5

More particularly, the present invention provides disperse dyestuffs containing the group of formula I,

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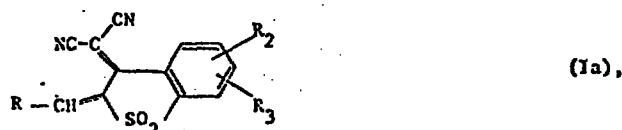
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in which R₁ signifies the atoms necessary to complete an arylene radical.

- 15 Preferred dyestuffs are those in which the group of formula I is bound to a group of the benzene, indoline or hydroquinoline series. 15

More preferred dyestuffs are those of formula Ia,

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20

- 25 in which R is a group of formula (a) or (b), 25

30



30

- R₂ is hydrogen, chlorine, bromine, hydroxy, amino, (C₁₋₂)alkyl, phenyl, (C₁₋₂)alkoxy, phenoxy, cyano, nitro (C₁₋₄)alkylsulphonyl, aminosulphonyl, mono- or di-(C₁₋₄)alkylaminosulphonyl, phenylaminosulphonyl, 35 N-phenyl-N-(C₁₋₂)alkylaminosulphonyl, alkoxy(C₁₋₆) carbonyl, phenoxycarbonyl, aminocarbonyl, mono- or di-(C₁₋₄)alkylaminocarbonyl, phenylaminocarbonyl, N-phenyl-N-(C₁₋₂)alkylaminocarbonyl, alkyl(C₁₋₆)carbonyloxy, chloro- or bromo-(C₁₋₂)alkylcarbonyloxy, alkoxy-(C₁₋₆)carbonyloxy, (C₁₋₂)alkoxy(C₂₋₆)alkoxycarbonyloxy, phenoxycarbonyloxy, (C₁₋₄) alkylsulphonyloxy, phenylsulphonyloxy, alkyl(C₁₋₄)carbonylamino, alkoxy-(C₁₋₂)alkoxy(C₂₋₄)carbonylamino, chloro- or bromo-alkyl(C₁₋₂)carbonylamino, alkoxy(C₁₋₄)carbonylamino, phenoxycarbonyl- amino, aminocarbonylamino, mono- or di-(C₁₋₄)alkylaminocarbonylamino, 40 phenylamino- carbonylamino, N-phenyl-N-(C₁₋₂)alkylamino- carbonylamino, benzoyloxy, naphthoyloxy, benzoylamino, di-(C₁₋₄)alkylaminosulphonyloxy, mono- or di-(C₁₋₄)alkylaminocarbonyloxy or phenylaminocarbonyloxy, 40

R₃ is hydrogen, chlorine, bromine, (C₁₋₂)-alkyl, (C₁₋₂)alkoxy or alkoxy(C₁₋₄)carbonyl,

- 45 R₄ is hydroxyl, (C₁₋₄)alkoxy or -NR₆R₇, 45

R₅ is hydrogen, chlorine, bromine, hydroxyl, (C₁₋₄)alkyl, (C₁₋₄)alkoxy, phenoxy, alkyl(C₁₋₆)carbonylamino, phenylcarbonylamino, alkoxy(C₁₋₄)carbonylamino, alkyl(C₁₋₆)carbonyloxy, phenylcarbonyloxy, naphthylcarbonyloxy, chloro- or bromoalkyl(C₁₋₂)carbonyloxy, alkoxy(C₁₋₆)carbonyloxy, alkoxy(C₁₋₂)alkoxy(C₂₋₆)carbonyloxy, phenoxycarbonyloxy, (C₁₋₄)alkylsulphonyloxy, phenylsulphonyloxy, di-(C₁₋₄)alkylaminosulphonyloxy, di-(C₁₋₄)alkylaminocarbonyloxy, (C₁₋₆)alkylaminocarbonyloxy, phenyl, 50 phenylaminocarbonyloxy or phenoxycarbonylamino 50

each or R₆ and R₇,

- independently, is hydrogen, (C₁₋₁₂)alkyl, benzyl, chloro- or bromo- benzyl, (C₅₋₇)cycloalkyl, allyl, (C₂₋₁₂)alkyl monosubstituted by chlorine, bromine, hydroxyl, (C₁₋₁₂)alkoxy, (C₁₋₆)alkoxy- (C₂₋₆)alkoxy, phenyl, 55 phenyl(C₁₋₆)alkoxy, phenoxy(C₂₋₆)alkoxy, cyano, naphthoxy, alkoxy (C₁₋₃)carbonyl, alkyl (C₁₋₁₅)carbonyloxy, alkoxy(C₁₋₁₂)carbonyloxy, benzoyloxy, phenylaminocarbonyloxy or phenoxy, the benzene nucleus of which phenoxy being unsubstituted or substituted by a total of up to three substituents selected from chlorine, bromine, methyl (max. 3 of each) (C₁₋₄)alkoxy (max. 2 of these), (C₂₋₁₂)alkyl and phenyl (max. 1 of each of these), 55

- 60 R₈ is hydrogen, chlorine, bromine, (C₁₋₂) alkyl or (C₁₋₂)alkoxy, and 60

R₉ is -CH₂CH₂-, -(CH₂)₃-, $\overset{*}{\text{C}}(\text{CH}_3)_2\text{-CH}_2\text{-CH}(\text{CH}_3)\text{-}$ or $\overset{*}{\text{C}}(\text{CH}_3)_2\text{-CH=C}(\text{CH}_3)\text{-}$ where the carbon atom marked with the asterisk is attached to the N-atom.

Any alkyl groups or moieties in the molecule may be straight-chain or branched with the proviso that the molecule is free from acetal groupings e.g. -O-C-O- and -N-C-O-.

- 65 R₂ is preferably R₂', where R₂' is hydrogen, chlorine, bromine, hydroxy, (C₁₋₂)alkoxy, cyano, nitro, methyl, 65

alkoxy(C₁₋₈)carbonyl, phenoxy carbonyl, aminocarbonyl, mono- or di-(C₁₋₄)alkylaminocarbonyl, phenylaminocarbonyl, N-phenyl-N-(C₁₋₂)alkylaminocarbonyl, alkyl(C₁₋₆)carbonyloxy, benzoyloxy, alkoxy(C₁₋₈)carbonyloxy or phenoxy carbonyloxy. More preferably, R₂ is R₂^{''}, where R₂^{''} is hydrogen or in the 5' or 6'-position, chlorine, bromine, methyl, methoxy or ethoxy. Most preferably R₂ is hydrogen or chlorine in the 6'-position.

5 R₃ is preferably hydrogen.

R₄ is preferably -NR₆R₇ bound to the 4-position.

R₅ is preferably R₅['], where R₅['] is hydrogen, methyl, methoxy or ethoxy in the 2-position.

10 R₆ is preferably R₆['], where R₆['] is (C₁₋₁₂)alkyl, benzyl, chlorobenzyl, (C₅₋₇) (preferably C₆) cycloalkyl, allyl, (C₂₋₁₂)alkyl mono substituted by chlorine, bromine, hydroxyl, (C₁₋₁₂)alkoxy, phenyl, phenyl(C₁₋₆)alkoxy, (C₂₋₆)alkoxy-(C₂₋₆)alkoxy, phenoxy(C₂₋₆)alkoxy, naphthoxy or phenoxy, the benzene nucleus of which phenoxy being unsubstituted or substituted by up to three substituents selected from the group consisting of chlorine, bromine, methyl (up to 3 of each of these), (C₁₋₄)alkoxy (max. 2 of each of these), (C₂₋₁₂)alkyl and phenyl (max. one of these).

R₇ is preferably R₇['] where R₇['] has one of the significances of R₆['].

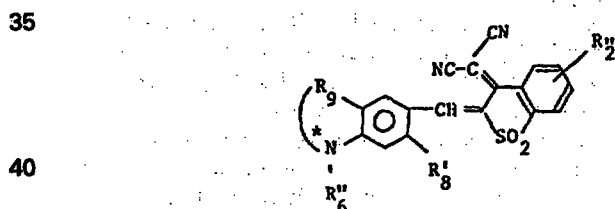
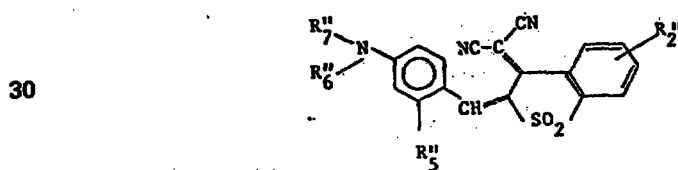
15 R₈ is more preferably R₈['], where R₈['] is (C₁₋₁₂)alkyl, benzyl or (C₂₋₁₂)alkyl monosubstituted by (C₁₋₁₂)alkoxy, phenyl, phenyl-(C₁₋₃)alkoxy, (C₁₋₄)alkoxy(C₂₋₄)alkoxy, phenoxy(C₂₋₆)alkoxy, naphthoxy or phenoxy, the benzene nucleus of which phenoxy is unsubstituted or substituted by up to three substituents selected from the group consisting of chloro, bromine, methyl (up to three of each of these), (C₁₋₂)alkoxy (max. two of these), (C₂₋₈)alkyl and phenyl (max. one of each of these). Most preferably R₈ is (C₂₋₈)alkyl or phenyl(C₁₋₃)alkyl.

20 R₇ is preferably R₇^{''} where R₇^{''} has one of the significance of R₆['] which the proviso that at least one of R₆['] and R₇^{''} contains at least 4 carbon atoms. Most preferably R₇ is (C₄₋₁₂)alkyl or phenyl (C₂₋₃)alkyl.

R₈ is preferably R₈['] where R₈['] is hydrogen or methyl.

Thus, preferred compounds of formula I_a, are those in which R₅ is R₅['], R₆ is R₆['] and R₇ is R₇['].

25 More preferred compounds are those of formula I_b and I_c



40 in which R₂^{''}, R₅['], R₆['], R₇['], R₈['] and R₉ are as defined above, especially those compounds of formula I_b and I_c, in which R₂^{''} is hydrogen or chlorine in the 6'-position and in which any phenoxy substituted-alkyl as R₆['] and/or R₇['] is an unsubstituted-phenoxyalkyl group.

45 Most preferred compounds of formula I_b are those in which R₆['] is (C₂₋₈)alkyl or phenyl(C₁₋₃)alkyl and R₇['] is (C₄₋₁₂)alkyl or phenyl (C₂₋₃)alkyl.

Most preferred compounds of formula I_c are those in compounds which R₈['] is (C₂₋₈)alkyl or phenyl(C₁₋₃)alkyl. The compounds of formula I_b are preferred.

50 The present invention further provides a process for the production of disperse dyes bearing a group of formula I, comprising condensing a compound of formula II,



60 with an aldehyde or a functional derivative thereof.

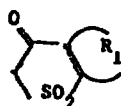
The condensation reaction with the compound of formula II may be carried out under Knoevenagel condensation reaction conditions.

65 The condensation reaction is suitably effected in an inert organic solvent e.g. alcohols, especially ethanol, n-propanol, benzene, toluene; chlorobenzenes; chloroform; dimethylformamide; N-methylpyrrolidone; dimethylsulphoxide; sulpholane; acetonitrile etc.

Suitable reaction temperatures, when using an aldehyde or a functional derivative are from 20 to 150°C. With aldehyde the temperature is preferably from 30 to 100°C. It is advantageous to employ a catalyst, especially an organic base such as pyridine, piperidine or a piperidine/glacial acetic acid mixture. If the aldehyde is one which has been formed by the Vilsmeier Reaction, it is not necessary to separate the latter as the condensation reaction may be effected in the same reaction vessel, i.e. using the Vilsmeier Complex. If this is the case then the reaction is preferably conducted at a temperature from 0 to 100°C, more preferably from 20 to 80°C. Suitable functional derivatives of aldehydes include Schiff bases, acetals, sulphite addition products, oximes and hydrazones. Preferably, the reaction is carried out using an aldehyde or the Vilsmeier complex.

The compounds of formula II and their production also from part of the present invention.

The process for the production of the compounds of formula II comprises condensing a compound of formula III,



III

with malonic acid dinitrile.

The condensation reaction of the compound of formula III with malonic acid dinitrile is effected in accordance with known methods. e.g. Knoevenagel reaction condition as described above. Suitable temperatures are from 20 and 150°C, preferably 50-120°C.

The compounds of formula III are either known or may be prepared in accordance with known methods from available starting materials.

The disperse dyestuffs according to the invention may be made up into dyeing preparations in accordance with known methods, for example by grinding in the presence of dispersing agents and/or fillers. Aqueous dispersions of such dyestuff preparation may be used for exhaust dyeing padding or printing textiles consisting of or comprising synthetic or semi-synthetic, hydrophobic, high-molecular organic materials. Especially preferred substrates include linear, aromatic polyesters, cellulose 2 1/2 acetate, cellulose triacetate and synthetic polyamides.

Dyeing and printing may be effected in accordance with known methods, for example as described in French Patent No. 1,445,371. The dyestuffs of the present invention are also suitable for dyeing by the well-known solvent dyeing processes.

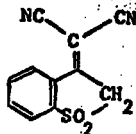
The dyestuffs of the present invention give exceptionally brilliant dyeings. Furthermore the dyestuffs have high dyeing strength and thus give good deep dyeings.

Reference is made to our co-pending British Patent Application No. 8133975 (Serial No. 2084153).

The following Examples further serve to illustrate the invention. In the Examples all parts are by weight and the temperatures are given in degrees Centigrade.

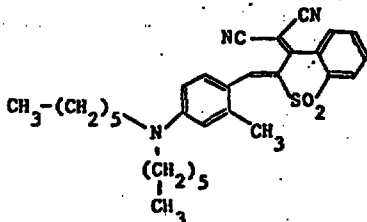
Example 1

a) 20 Parts 3-oxo-2,3-dihydro-1-benzothiophene-1,1-dioxide, 8 parts malonic acid dinitrile and 0.2 parts of a mixture (1:5) of piperidine and glacial acetic acid are dissolved in 250 parts anhydrous ethanol and heated to 60° for 6 hours with stirring. A further 4 parts of malonic acid dinitrile are added and the mixture is stirred further for 16 hours at 60°. Subsequently, the mixture is cooled to 5° and the product of formula



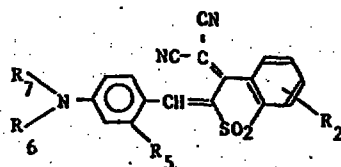
is filtered, washed with ice-cold ethanol and dried in vacuo.

b) 12 Parts 3-N,N-di-n-hexyl-toluidine are dissolved in 50 parts dry dimethylformamide, reacted with 7 parts phosphorousoxychloride with cooling and subsequently heated at 60° for 4 hours. The cooled solution is added dropwise at room temperature with stirring to a suspension of 10 parts of the product obtained as described under a) above and 15 parts anhydrous sodium acetate in 200 parts absolute alcohol. The mixture is stirred over-night at room temperature and the precipitated dye of formula



is filtered, washed with ice-cold absolute alcohol, slurried in 500 parts ice water, filtered again, washed with ice-cold water and dried in vacuo.

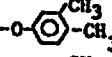
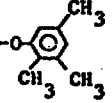
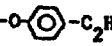
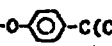
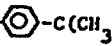
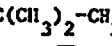
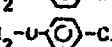
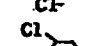
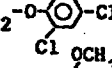
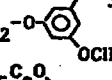
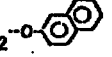
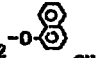
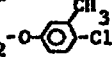
In analogy with the procedure described above the dyestuffs of the following Tables 1 and 2 may be prepared. The dyestuffs of Table 1 correspond to the formula



The starting materials of formula II of Examples 65 to 92 are made in analogy with the procedure described 15 in Example 1 a).

Table 1

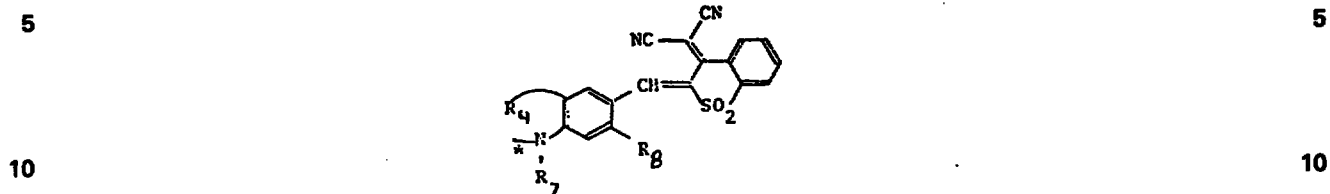
Example No.	R ₂	R ₅	R ₆	R ₇
2	H	-CH ₃	-C ₂ H ₅	-(CH ₂) ₅ CH ₃
3	H	do.	do.	-(CH ₂) ₇ CH ₃
4	H	do.	do.	-(CH ₂) ₉ CH ₃
5	H	do.	do.	-(CH ₂) ₁₁ CH ₃
6	H	do.	-(CH ₂) ₃ CH ₃	-(CH ₂) ₃ CH ₃
7	H	do.	-CH ₂ CH ₂ CH(CH ₃) ₂	-CH ₂ CH ₂ CH(CH ₃) ₂
8	H	do.	-(CH ₂) ₇ CH ₃	do.
9	H	do.	do.	-(CH ₂) ₇ CH ₃
10	H	do.	-CH ₂ -C ₆ H ₅	do.
11	H	do.	-CH ₂ CH ₂ -C ₆ H ₅	do.
12	H	do.	-(CH ₂) ₃ -C ₆ H ₅	do.
13	H	do.	do.	-(CH ₂) ₃ -C ₆ H ₅
14	H	do.	-CH ₂ CH ₂ -C ₆ H ₅	-CH ₂ CH ₂ -C ₆ H ₅
15	H	do.	do.	-(CH ₂) ₃ CH ₃
16	H	do.	-CH ₂ -C ₆ H ₅	do.
17	H	do.	-(CH ₂) ₅ CH ₃	-CH ₂ CH ₂ -C ₆ H ₅
18	H	do.	-(CH ₂) ₃ CH ₃	-CH ₂ CH ₂ -O-C ₂ H ₅
19	H	do.	-C ₂ H ₅	-CH ₂ CH ₂ -O-(CH ₂) ₃ CH ₃
20	H	do.	do.	-CH ₂ CH ₂ -O-(CH ₂) ₇ CH ₃
21	H	do.	do.	-CH ₂ CH ₂ -O-(CH ₂) ₁₁ CH ₃
22	H	do.	do.	-CH ₂ CH ₂ -O-CH ₂ -C ₆ H ₅
23	H	do.	do.	-CH ₂ CH ₂ -O-(CH ₂) ₃ -C ₆ H ₅
24	H	do.	do.	-CH ₂ CH ₂ -O-(CH ₂) ₄ -OCH ₃
25	H	do.	do.	-CH ₂ CH ₂ -O-(CH ₂) ₆ -OCH ₃
26	H	do.	do.	-CH ₂ CH ₂ -O-CH ₂ CH ₂ -O-(CH ₂) ₃ CH ₃
27	H	do.	do.	-CH ₂ CH ₂ -O-CH ₂ CH ₂ -O-(CH ₂) ₅ CH ₃
28	H	do.	do.	-CH ₂ CH ₂ -O-CH ₂ CH ₂ -O-C ₆ H ₅
29	H	do.	do.	-CH ₂ CH ₂ -O-(CH ₂) ₆ -O-C ₆ H ₅
30	H	do.	do.	-(CH ₂) ₄ -O-C ₆ H ₅

Example No.	R ₂	R ₅	R ₆	R ₇
31	H	-CH ₃	-C ₂ H ₅	-(CH ₂) ₅ -O-C ₆ H ₁₁
32	H	do.	do.	-(CH ₂) ₆ -O-C ₆ H ₅
33	H	do.	do.	-(CH ₂) ₁₀ -O-C ₆ H ₅
34	H	do.	do.	-(CH ₂) ₁₂ -O-C ₆ H ₅
35	H	do.	-(CH ₂) ₃ CH ₃	-CH ₂ CH ₂ -O-  -CH ₃
36	H	do.	do.	-CH ₂ CH ₂ -O-  -CH ₃
37	H	do.	do.	-CH ₂ CH ₂ -O-  -CH ₃
38	H	do.	do.	-CH ₂ CH ₂ -O-  -C ₂ H ₅
39	H	do.	-C ₂ H ₅	-CH ₂ CH ₂ -O-  -C(CH ₃) ₃
40	H	do.	do.	-(CH ₂) ₃ -O-  -C(CH ₃) ₃
41	H	do.	do.	-CH ₂ CH ₂ -O-  -C(CH ₃) ₂ C ₂ H ₅
42	H	do.	do.	-CH ₂ CH ₂ -O-  -C(CH ₃) ₂ -CH ₂ -C(CH ₃) ₃
43	H	do.	do.	-(CH ₂) ₆ -O-  -C ₆ H ₅
44	H	do.	do.	-CH ₂ CH ₂ -O-  -Br
45	H	do.	do.	-CH ₂ CH ₂ -O-  -Cl
46	H	do.	do.	-CH ₂ CH ₂ -O-  -Cl
47	H	do.	do.	-CH ₂ CH ₂ -O-  -OCH ₃
48	H	do.	do.	-CH ₂ CH ₂ -O-  -OCH ₃
49	H	do.	-(CH ₂) ₃ CH ₃	-CH ₂ CH ₂ -O-  -CH ₃
50	H	do.	do.	-CH ₂ CH ₂ -O-  -CH ₃
51	H	do.	do.	-CH ₂ CH ₂ -O-  -Cl

Example No.	R ₂	R ₅	R ₆	R ₇
52	H	-CH ₃	-C ₂ H ₅	$\begin{array}{c} \text{CH}_3 \\ \\ -\text{CH}_2\text{CH}_2-\text{O}-\text{C}_6\text{H}_4-\text{C}(\text{CH}_3)_3 \end{array}$
53	H	do.	-(CH ₂) ₃ CH ₃	$-\text{CH}_2-\text{C}_6\text{H}_4-\text{Cl}$
54	H	do.	do.	$-\text{CH}_2-\text{C}_6\text{H}_4-\text{Cl}$
55	H	do.	do.	Cyclohexyl
56	H	do.	-(CH ₂) ₅ CH ₃	-CH ₂ -CH=CH ₂
57	H	do.	-(CH ₂) ₇ CH ₃	-CH ₂ CH ₂ -Cl
58	H	do.	do.	-CH ₂ CH ₂ -Br
59	H	do.	do.	-CH ₂ CH ₂ -OH
60	H	do.	-C ₂ H ₅	$-\text{CH}_2\text{CH}_2-\text{O}-\text{CH} \begin{array}{l} (\text{CH}_2)_2\text{CH}_3 \\ \text{CH}_2\text{CH}_2-\text{C}_6\text{H}_5 \end{array}$
61	H	do.	-CH ₃	-(CH ₂) ₁₁ CH ₃
62	H	H	-C ₂ H ₅	-(CH ₂) ₉ CH ₃
63	H	-OCH ₃	-(CH ₂) ₅ CH ₃	-(CH ₂) ₅ CH ₃
64	H	-OC ₂ H ₅	do.	do.
65	6'-Cl	-CH ₃	-C ₂ H ₅	-C ₂ H ₅
66	do.	do.	-(CH ₂) ₃ CH ₃	-(CH ₂) ₃ CH ₃
67	5'-Cl	do.	do.	do.
68	6'-Br	do.	do.	do.
69	5'-CH ₃	do.	do.	do.
70	6'-CH ₃	do.	do.	do.
71	5'-OH	do.	do.	do.
72	5'-OCH ₃	do.	do.	do.
73	5'-OC ₂ H ₅	do.	do.	do.
74	5'-CN	do.	do.	do.
75	5'-NO ₂	do.	do.	do.
76	6'-COOCH ₃	do.	do.	do.
77	6'-COO(CH ₂) ₅ CH ₃	do.	do.	do.
78	6'-COOC ₆ H ₅	do.	do.	do.
79	6'-CONH ₂	do.	do.	do.
80	6'-CONH(CH ₂) ₃ CH ₃	do.	do.	do.
81	6'-CON(CH ₃) ₂	-CH ₃	-(CH ₂) ₃ CH ₃	-(CH ₂) ₃ CH ₃
82	6'-CONHC ₆ H ₅	do.	do.	do.
83	6'-CON(CH ₃)C ₆ H ₅	do.	do.	do.
84	6'-CON(C ₂ H ₅)C ₆ H ₅	do.	do.	do.
85	5'-OCOCH ₃	do.	do.	do.
86	5'-OCOC ₂ H ₅	do.	do.	do.
87	5'-OCO(CH ₂) ₅ CH ₃	do.	do.	do.
88	5'-OCOC ₆ H ₅	do.	do.	do.
89	5'-O-CO-OCH ₃	do.	do.	do.
90	5'-O-CO-OC ₂ H ₅	do.	do.	do.
91	5'-O-CO-O(CH ₂) ₅ CH ₃	do.	do.	do.
92	5'-O-CO-OC ₆ H ₅	do.	do.	do.

Table 2

The dyestuffs of this Table correspond to the formula



and give blue dyeings on polyester fibres.

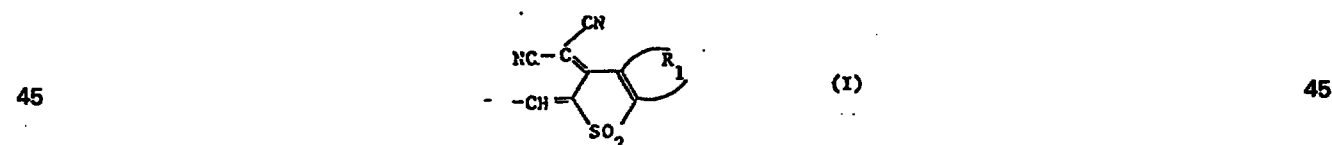
Example No.	R ₇	R ₈	R ₉
93	-(CH ₂) ₅ CH ₃	-CH ₂ CH ₂	H
94	-(CH ₂) ₉ CH ₃	do.	H
95	-(CH ₂) ₅ CH ₃	-(CH ₂) ₃ -	H
96	-(CH ₂) ₇ CH ₃	do.	H
97	-(CH ₂) ₅ CH ₃	*-C(CH ₃) ₂ -CH ₂ -CH(CH ₃)-	H
98	do.	do.	-CH ₃
99	do.	*-C(CH ₃) ₂ -CH=C(CH ₃)-	do.
100	-(CH ₂) ₃ CH ₃	do.	H

Application Example

- 7 parts of the dyestuff obtained in Example 1 are ground with 13 parts sodiumligninsulphonate, 25 parts water and 100 parts silica quartz beads until the diameter of the dyestuff particles are less than 1 μ . The suspension is filtered to separate the silica quartz beads and is dried under mild conditions. 1 Part of the soobtained dyestuff preparation is stirred with 4000 parts water at 60°, which water is buffered to pH 5. Using this dyebath 100 parts polyester fabric are dyed at 98° for 1 hour with the addition of ortho-phenylphenol. After cooling, rinsing, soaping, rinsing again and drying, a exceptionally brilliant even blue dyeing with good fastnesses is obtained.
- In analogy to the procedure described above the dyestuff of Examples 2 - 100 may be used to give brilliant blue dyeings on polyester fibres.

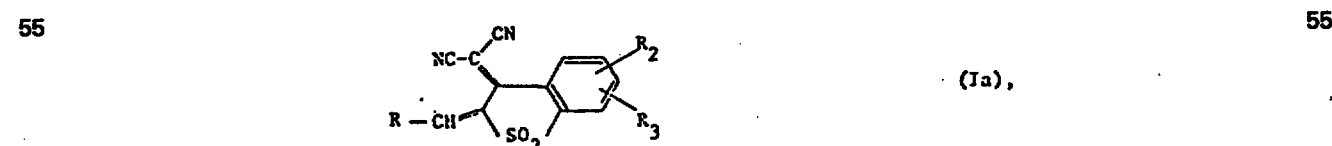
CLAIMS

1. A disperse dyestuff containing the group of formula I,



in which R₁ signifies the atoms necessary to complete an arylene radical.

2. A dyestuff according to Claim 1, in which the group of formula I is bound to a group of the benzene, indoline or hydroquinoline series.
3. A dyestuff according to Claim 1 or Claim 2, in which R₁ signifies the atoms necessary to complete a ring of the 1,2-phenylene series.
4. A compound of formula Ia,



- in which R is a group of formula (a) or (b),

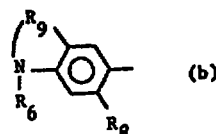
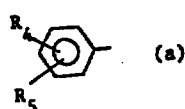
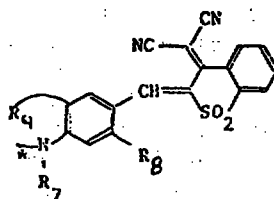




Table 2

The dyestuffs of this Table correspond to the formula

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and give blue dyeings on polyester fibres.

15

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Example
No.

R₇R₉R₈93 -(CH₂)₅CH₃-CH₂CH₂

H

94 -(CH₂)₉CH₃

do.

H

95 -(CH₂)₅CH₃-(CH₂)₃-

H

96 -(CH₂)₇CH₃

do.

H

97 -(CH₂)₅CH₃*-C(CH₃)₂-CH₂-CH(CH₃)-

H

98 do.

do.

-CH₃

99 do.

*-C(CH₃)₂-CH=C(CH₃)-

do.

100 -(CH₂)₃CH₃

do.

H

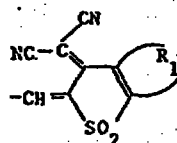
Application Example

7 parts of the dyestuff obtained in Example 1 are ground with 13 parts sodiumligninsulphonate, 25 parts water and 100 parts silica quartz beads until the diameter of the dyestuff particles are less than 1 μ . The suspension is filtered to separate the silica quartz beads and is dried under mild conditions. 1 Part of the soobtained dyestuff preparation is stirred with 4000 parts water at 60°, which water is buffered to pH 5. Using this dyebath 100 parts polyester fabric are dyed at 98° for 1 hour with the addition of ortho-phenylphenol. After cooling, rinsing, soaping, rinsing again and drying, a exceptionally brilliant even blue dyeing with good fastnesses is obtained.

In analogy to the procedure described above the dyestuff of Examples 2 - 100 may be used to give brilliant blue dyeings on polyester fibres.

CLAIMS

1. A disperse dyestuff containing the group of formula I,

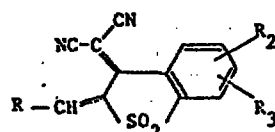


in which R₁ signifies the atoms necessary to complete an arylene radical.

2. A dyestuff according to Claim 1, in which the group of formula I is bound to a group of the benzene, indoline or hydroquinoline series.

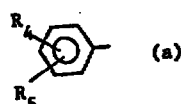
3. A dyestuff according to Claim 1 or Claim 2, in which R₁ signifies the atoms necessary to complete a ring of the 1,2-phenylene series.

4. A compound of formula Ia,

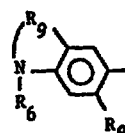


(Ia),

in which R is a group of formula (a) or (b),

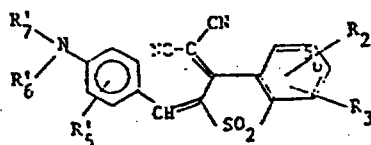


(a)



(b)

- R_2 is hydrogen, chlorine, bromine, hydroxy, amino, (C_{1-2}) alkyl, phenyl, (C_{1-2}) alkoxy, phenoxy, cyano, nitro, (C_{1-4}) alkylsulphonyl, aminosulphonyl, mono- or di- (C_{1-4}) alkylaminosulphonyl, phenylaminosulphonyl, N-phenyl-N- (C_{1-2}) alkylaminosulphonyl, alkoxy (C_{1-6}) carbonyl, phenoxycarbonyl, aminocarbonyl, mono- or di- (C_{1-4}) alkylaminocarbonyl, phenylaminocarbonyl, N-phenyl-N- (C_{1-2}) alkylaminocarbonyl, alkyl (C_{1-6}) carbonyloxy, chloro- or bromo- (C_{1-2}) alkylcarbonyloxy, alkoxy- (C_{1-6}) carbonyloxy, (C_{1-2}) alkoxy (C_{2-6}) alkoxycarbonyloxy, phenoxycarbonyloxy, (C_{1-4}) alkylsulphonyloxy, phenylsulphonyloxy, alkyl (C_{1-4}) carbonylamino, alkoxy- (C_{1-2}) alkoxy (C_{2-4}) carbonylamino, chloro- or bromo-alkyl (C_{1-2}) carbonylamino, alkoxy (C_{1-4}) -carbonylamino, phenoxycarbonylamino, aminocarbonylamino, mono- or di- (C_{1-4}) alkylaminocarbonylamino, phenylaminocarbonylamino, N-phenyl-N- (C_{1-2}) alkylaminocarbonylamino, benzoyloxy, naphthoyloxy, benzoylamino, di- (C_{1-4}) alkylaminosulphonyloxy, mono- or di- (C_{1-4}) alkylaminocarbonyloxy or phenylaminocarbonyloxy, 5
- R_3 is hydrogen, chlorine, bromine, (C_{1-2}) -alkyl, (C_{1-2}) alkoxy or alkoxy (C_{1-4}) carbonyl, 10
- R_4 is hydroxyl, (C_{1-4}) alkoxy or $-NR_6R_7$, 10
- R_5 is hydrogen, chlorine, bromine, hydroxyl, (C_{1-4}) alkyl, (C_{1-4}) alkoxy, phenoxy, alkyl (C_{1-6}) carbonylamino, phenylcarbonylamino, alkoxy (C_{1-4}) carbonylamino, alkyl- (C_{1-6}) carbonyloxy, phenylcarbonyloxy, naphthylcarbonyloxy, chloro- or bromo-alkyl (C_{1-2}) carbonyloxy, alkoxy (C_{1-6}) -carbonyloxy, alkoxy (C_{1-2}) alkoxy (C_{2-6}) -carbonyloxy, phenoxycarbonyloxy, (C_{1-4}) -alkylsulphonyloxy, phenylsulphonyloxy, di- (C_{1-4}) alkylaminosulphonyloxy, di- (C_{1-4}) alkylaminocarbonyloxy, (C_{1-6}) alkylaminocarbonyloxy, phenyl, phenylaminocarbonyloxy or phenoxycarbonylamino 15
- each of R_6 and R_7 , 20
- independently, is hydrogen, (C_{1-12}) alkyl, benzyl, chloro- or bromo- benzyl, (C_{5-7}) cycloalkyl, allyl, (C_{2-12}) alkyl monosubstituted by chlorine, bromine, hydroxyl, (C_{1-12}) alkoxy, (C_{1-6}) alkoxy- (C_{2-6}) alkoxy, phenyl phenyl (C_{1-6}) alkoxy, phenoxy (C_{2-6}) alkoxy, cyano, naphthoxy, alkoxy (C_{1-3}) carbonyl, alkyl (C_{1-15}) -carbonyloxy, alkoxy (C_{1-12}) carbonyloxy, benzoyloxy, phenylaminocarbonyloxy or phenoxy, the benzene nucleus of which phenoxy being unsubstituted or substituted by a total of up to three substituents selected from chlorine, bromine, methyl (max. 3 of each) (C_{1-4}) alkoxy (max. 2 of these), (C_{2-12}) alkyl and phenyl (max. 1 of each of these), 25
- R_8 is hydrogen, chlorine, bromine, (C_{1-2}) alkyl or (C_{1-2}) alkoxy, and 25
- R_9 is $-CH_2CH_2-$, $-(CH_2)_3-$, $-\dot{C}(CH_3)_2-CH_2-CH(CH_3)-$ or $-\dot{C}(CH_3)_2-CH=C(CH_3)-$ where the carbon atom marked with the asterisk is attached to the N-atom. 30
5. A compound according to Claim 4, in which R_2 is R_2' , where R_2' is hydrogen, chlorine, bromine, hydroxy, (C_{1-2}) alkoxy, cyano, nitro, methyl, alkoxy (C_{1-6}) carbonyl, phenoxycarbonyl, aminocarbonyl, mono- or di- (C_{1-4}) alkylaminocarbonyl, phenylaminocarbonyl, N-phenyl-N- (C_{1-2}) alkylaminocarbonyl, alkyl- (C_{1-6}) carbonyloxy, benzoyloxy, alkoxy (C_{1-6}) carbonyloxy or phenoxycarbonyloxy. 35
6. A compound according to Claim 4 or Claim 5, in which R_5 is hydrogen. 35
7. A compound according to any one of Claims 4 to 6 in which R_4 is $-NR_6R_7$ in the 4-position. 35
8. A compound according to any of Claims 4 to 7, in which R_5 is R_5' , where R_5' is hydrogen or methyl, methoxy or ethoxy in the 2-position, R_6 is R_6' , where R_6' is (C_{1-12}) alkyl, benzyl, chlorobenzyl, (C_{5-7}) -cycloalkyl, allyl, (C_{2-12}) alkyl mono substituted by chlorine, bromine, hydroxyl, (C_{1-12}) -alkoxy, phenyl, phenyl (C_{1-6}) alkoxy, (C_{1-6}) alkoxy (C_{2-6}) -alkoxy, phenoxy (C_{2-6}) alkoxy, naphthoxy or phenoxy, the benzene nucleus of which 40
- phenoxy being unsubstituted or substituted by up to three substituents selected from the group consisting of chlorine, bromine, methyl (up to 3 of each of these), (C_{1-4}) alkoxy (max. 2 of each of these), (C_{2-12}) alkyl and phenyl (max. one of these), and R_7 is R_7' , where R_7' has one of the significances of R_6' . 40
9. A compound according to any one of Claims 4 to 8, in which R_8 is R_8' , where R_8' is hydrogen or methyl. 45
10. A compound according to any one of Claims 4 to 9, in which R_2 is R_2' where R_2' is hydrogen or in the 5- or 6-position, chlorine, bromine, methyl, methoxy or ethoxy. 45
11. A compound according to any one of Claims 4 to 10, in which each of R_6 and R_7 , independently is R_6' and R_7' , where each of R_6' and R_7' , independently, is (C_{1-12}) alkyl, benzyl, or (C_{2-12}) alkyl monosubstituted by (C_{1-12}) alkoxy, phenyl, phenyl (C_{1-3}) alkoxy, (C_{2-4}) alkoxy (C_{2-4}) alkoxy, phenoxy (C_{2-6}) alkoxy, naphthoxy or phenoxy, the benzene nucleus of which phenoxy is unsubstituted or substituted by up to three substituents selected from the group consisting of chloro, bromine, methyl (up to three of each of these), (C_{1-2}) alkoxy (max. two of these), (C_{2-8}) alkyl and phenyl (max. one of each of these). 50
12. A compound according to Claim 4, of formula Ia, 55



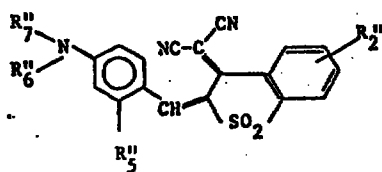
1a

in which R_5' , R_6' and R_7' are as defined in Claim 8. 60

13. A compound according to Claim 12, of formula Ib,



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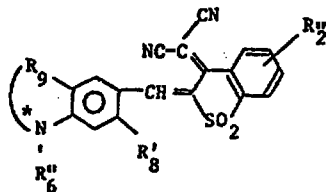
I_b

in which R''₂ is as defined in Claim 10

R''₅ is as defined in Claim 8 and

R''₆ and R''₇ are as defined in Claim 11.

14. A compound according to any one of Claims 4 to 11 of formula I_c,



I_c

in which R''₅ is as defined in Claim 9

R''₂ is as defined in Claim 10

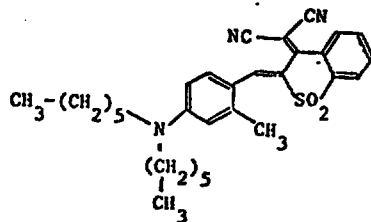
R''₆ is as defined in Claim 11 and

R''₇ is as defined in Claim 4.

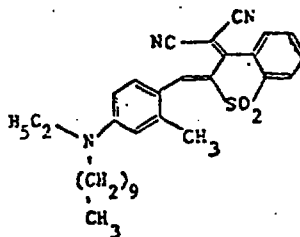
15. A compound according to Claim 13 or Claim 14, in which R''₂ is hydrogen or chlorine in the 6-position and any phenoxy substituted alkyl as R''₆ and/or R''₇ is unsubstituted phenoxyalkyl.

16. A compound according to Claim 15, in which R''₆ is (C₂₋₈)alkyl or phenyl(C₁₋₃)alkyl and R''₇ is (C₄₋₁₂)alkyl or phenyl(C₂₋₃)alkyl and R''₂ is hydrogen.

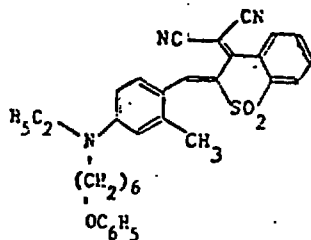
17. A compound of formula



18. A compound of formula

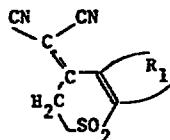


19. A compound of formula



20. A process for the production of a disperse dyestuff as defined in Claim 1, comprising condensing a compound of formula II,

72



II

5

5

with an aldehyde or a functional derivative thereof.

21. A process for the production of a disperse dye as defined in Claim 1, substantially as hereinbefore described with reference to any one of Examples 1 to 100.

22. A disperse dyestuff whenever prepared by a process according to Claim 20 or Claim 21.

23. A process for dyeing or printing textiles consisting of or comprising synthetic or semi-synthetic, hydrophobic, high molecular weight organic material comprising employing a compound according to any one of Claims 1 to 19 or 22, as dyestuff.

24. A process for dyeing or printing disperse dyeable substrates substantially as hereinbefore described with reference to the Application Example.

25. Dyed or printed substrates whenever obtained by a process according to Claim 23 or Claim 24.

ERRATA

SPECIFICATION NO. 2026528B

Front page, (54) Title of invention for

Improvements in or relating to organic compounds *read* Dicyanomethylidene-dihydrothiophene dioxide derivatives

Page No. 8, Line No. 21 *for* chlorol *read* Chloro

Page No. 8, Line No. 35 *for* R₅ *read* R₃

Page No. 8, Line No. 49 *for* C₂₋₄ alkoxy (C₂₋₄) alkoxy *read* (C₁₋₄) alkoxy (C₂₋₄) alkoxy

Page No. 9, Line No. 25 *for* the 6 position *read* the 6' position