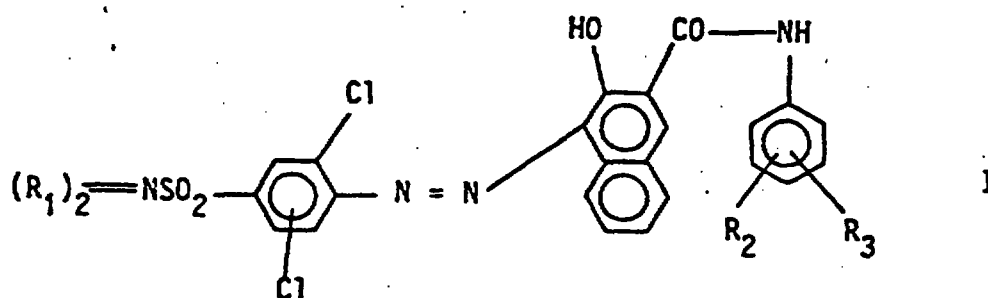


1-(DICHLORO-4-SULPHAMOYL OR SUBSTITUTED SULPHAMOYL) PHENYLAZO
COMPOUNDS USEFUL AS PIGMENTS

The invention relates to azo compounds.

The invention provides azo compounds of formula I



in which each R_1 , independently, is hydrogen; C_{1-8} alkyl; C_{2-3} alkyl substituted by up to two substituents selected from halogen, hydroxy, cyano, methoxy, ethoxy and alkoxy- C_{1-2} -carbonyl; or cyclohexyl, and each R_2 and R_3 , independently, is hydrogen, chlorine, bromine, methyl, methoxy or ethoxy.

Any unsubstituted alkyl group as R_1 may be straight-chain or branched. Preferred unsubstituted C_{1-8} alkyl groups are C_{1-4} alkyl, more preferably C_{1-3} alkyl, particularly methyl or ethyl groups.

Halogen is preferably chlorine or bromine, more preferably chlorine.

Preferably the substituted C_{2-3} alkyl groups as R_1 are mono-

substituted. Preferred substituents are cyano, hydroxy, methoxy, ethoxy and chlorine, more preferably hydroxy.

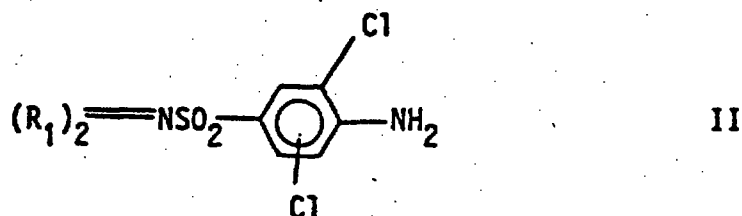
Each R_1 is preferably R_1' , where either both R_1' are identical and signify C_{1-2} alkyl or one R_1' is hydrogen and the other is C_{1-2} alkyl.

R_2 is preferably R_2' , where R_2' is hydrogen, chlorine, methyl, methoxy or ethoxy. More preferably, R_2 is R_2'' , where R_2'' is methyl or methoxy.

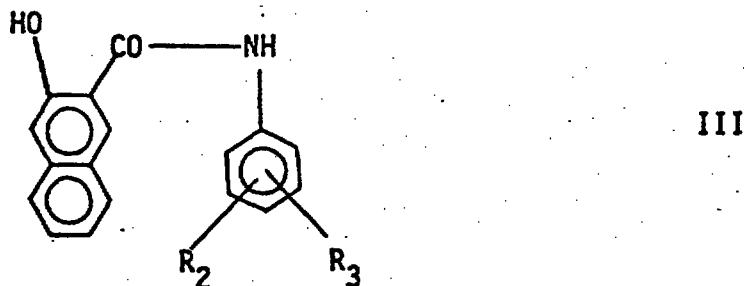
R_3 is preferably R_3' , where R_3' is hydrogen, chlorine or methyl. More preferably, R_3 is hydrogen.

Preferred compounds of formula I are those in which each R_1 is R_1' , R_2 is R_2' and R_3 is R_3' . More preferred compounds of formula I are those in which R_1 is R_1' , R_2 is R_2'' and R_3 is hydrogen.

The present invention further provides a process for the production of azo compounds of formula I comprising coupling a diazo derivative of an amine of formula II



with a compound of formula III



The diazotization and coupling reactions are carried out in accordance with known methods.

The compounds of formulae II and III are either known or may be

prepared in accordance with known methods from available starting materials.

The resulting compounds of formula I may be isolated and purified in conventional manner.

The compounds of formula I are useful as pigments, e.g. for the mass pigmenting of e.g. viscose, of surface coatings, such as paints, whether of an oil or water base, lacquers and inks. They may also be used in pigment printing, textile coating and for pigmenting paper in the mass. They may be employed for such uses in conventional manner and in conventional amounts.

The pigmentations obtained employing the compounds of formula I possess notably good fastness properties.

Before use, i.e. after synthesis, the pigments of formula I may be post-treated in an organic solvent, e.g. treated at the boil for a period up to 24 hours in a solvent such as ethanol, 2-methoxy-ethanol, 2-ethoxy-ethanol, o-dichlorobenzene or dimethylformamide and preferably milled. Such a treatment may be desirable since it may allow the conversion of the pigment into another advantageous crystalline form or have a purifying effect.

The following Examples, in which all parts and percentages are by weight and all temperatures in degrees Centigrade, illustrate the invention.

Example 1

a) Diazotization

53.8 Parts 1-amino-2,5-dichloro-benzene-4-sulphonic acid dimethylamide are slowly introduced with stirring into a mixture of 147 parts glacial acetic acid and 60 parts water. After the mixture has been stirred at room temperature for 16 hours, 117 parts 30% hydrochloric acid are added, the mixture is then cooled to about 0°C by the addition of 60 parts ice and simultaneously 14 parts of a 4N sodium nitrite solution are added in the course of 5 minutes. The resulting mixture is then stirred for 1 hour at 0-5° and thereafter the excess sodium nitrite is destroyed with a small amount of amino-sulphonic acid. After 5 minutes stirring, 2.0 parts filtering earth are added to the mixture which is then filtered. The filtration residue is washed with 10 parts water which are then combined with the filtrate.

b) Coupling component

58.6 Parts 2-hydroxy-3-naphthoic acid-2'-methoxyphenylamide are dissolved with stirring in 350 parts water, 10 parts commercially available anionic surfactant (liquid) and 53.4 parts NaOH 30%. 2.0 Parts filtering earth are added and the mixture is subsequently filtered. The filtration residue is washed with 10 parts water which are then combined with the filtrate.

c) Coupling

10 Parts commercially available anionic surfactant in liquid form are added to the diazonium salt solution (a) above and the resulting mixture is cooled to 0-5°. Whilst cooling and stirring, the coupling component solution prepared under b) is added to the mixture over 3 hours. The reaction mixture is further stirred for 2 hours at 0-5° and then for 1 hour at 22-25°, heated for 1 hour at 80° and finally filtered. The resulting pigment is washed with 5,000 parts water and then dried. The product possesses a scarlet shade.

By treating the pigment for about 2 hours in dimethylformamide at the boil, there is obtained a product having a red

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shade; when used after milling for colouring surface coatings, the resulting pigmentations have good light fastness.

Example 2

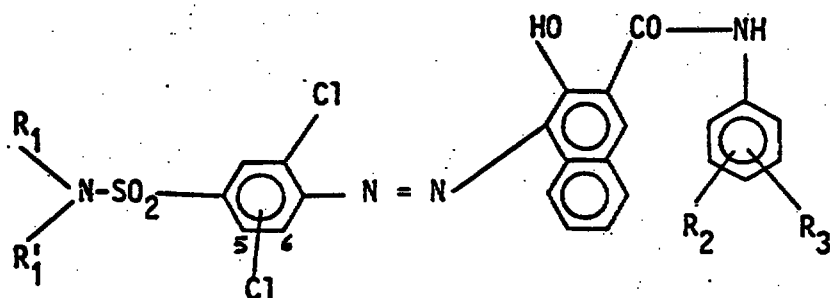
12.75 Gramm 1-amino-2,5-dichloro-benzene-4-sulphonic acid monomethylamide are introduced with stirring into 50 ml glacial acetic acid and 20 ml 30% hydrochloric acid. After the mixture has been cooled to about 0°, 6.3 ml of a 8N sodium nitrite solution are slowly added with stirring and stirring is then continued at 0-5° for a further hour. The excess of nitrite is destroyed by the addition of a small amount of aminosulphonic acid and the diazonium salt solution is filtered.

13.85 Gramm 2-hydroxy-3-naphthoic acid (2'-methyl-phenyl)amide are dissolved in 62 ml water and 10 ml 30% NaOH. After the addition of 2.5 ml commercially available liquid anionic surfactant, the mixture is cooled to about 0° and then added very slowly with stirring to the cooled diazonium solution. Stirring is then continued for a further hour at about 0°, 4 hours at 20° and 1 hour at 90°. The resulting red pigment is filtered, washed acid-free and dried in conventional manner.

Example 3

By following the procedure of Example 1, 1-amino-2,5-dichloro-benzene-4-sulphonic acid dimethylamide is diazotised and coupled with 2-hydroxy-3-naphthoic acid-4'-chlorophenylamide. The resulting pigment is treated at reflux for 1 hour in dimethylformamide and milled. This treatment produces a shade change from red to orange. The light fastness of the resulting pigmentations are improved.

By following the procedure of Examples 1, 2 and 3, the compounds of formula



as defined in Table 1 are obtained.

Table 1

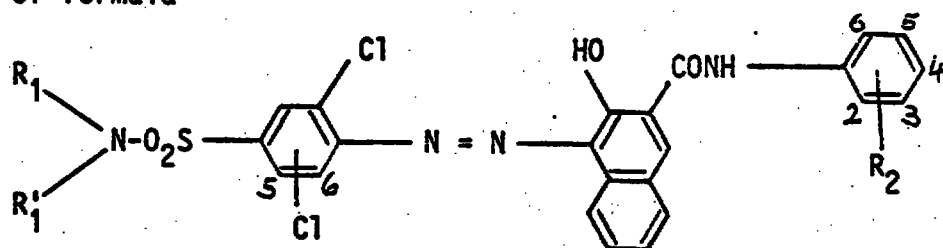
Ex. No.	R ₁	R ₁ '	R ₂	R ₃	Position of the 2nd Cl	Shade
4	-CH ₃	-CH ₃	H	H	5	yellowish-red
5	do.	do.	2-CH ₃	H	5	red
6	do.	do.	2-OCH ₃	4-OCH ₃	5	red
7	do.	do.	4-Cl	H	5	red
8	do.	do.	4-Cl	H	5	yellowish-red
9	do.	do.	2-CH ₃	4-Cl	5	yellowish-red
10	do.	do.	2-Cl	4-Cl	5	yellowish-red
11	do.	do.	2-Cl	5-Cl	5	red
12	do.	do.	2-Cl	H	5	red
13	do.	do.	4-OCH ₃	H	5	yellowish-red
14	do.	do.	4-Cl	H	6	yellowish-red
15	do.	do.	2-OC ₂ H ₅	H	5	yellowish-red
16	do.	H	2-OCH ₃	H	5	red
17	-C ₂ H ₅	-C ₂ H ₅	do.	H	5	red
18	H	H	2-CH ₃	H	5	red

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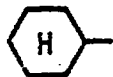
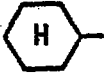
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Ex. No.	R ₁	R' ₁	R ₂	R ₃	Position of the 2nd Cl	Shade
19	H	H	2-CH ₃	4-Cl	5	red
20	-CH ₃	H	do.	H	5	red
21	do.	H	do.	4-Cl	5	red
22	-C ₂ H ₅	H	do.	H	5	red
23	do.	H	do.	4-Cl	5	red
24	-CH ₃	H	H	H	5	red
25	-C ₂ H ₅	H	H	H	5	red
26	do.	H	2-OCH ₃	H	5	red
27	-C ₂ H ₅	-C ₂ H ₅	H	H	5	yellowish-red

By following the procedure of Examples 1, 2, 3, the compounds of formula



as defined in Table 2 are obtained.

Ex. No.	R ₁	R ₁ '	R ₂	position of the 2nd chlorine	shade
28	CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	2-CH ₃	5	red
29	"	"	2-OCH ₃	5	red
30	H	"	2-CH ₃	5	red
31	H	CH ₂ CH ₂ COOC ₂ H ₅	2-CH ₃	5	red
32	CH ₂ CH ₂ OH	CH ₂ CH ₂ OH	2-CH ₃	5	red
33	"	"	2-OCH ₃	5	red
34	H	"	2-CH ₃	5	red
35	H	"	2-OCH ₃	5	red
36	CH ₂ CH ₂ OCH ₃	CH ₂ CH ₂ OCH ₃	2-CH ₃	5	red
37	H	"	2-OCH ₃	5	red
38		H	2-CH ₃	5	red
39	"		2-CH ₃	5	red
40	CH ₂ CH ₂ Cl	H	2-CH ₃	6	red
41	CH ₂ CH ₂ CH ₃	CH ₂ CH ₂ CH ₃	2-CH ₃	6	red
42	H	"	2-CH ₃	6	red
43	H	CH ₂ CH ₂ CH ₂ CH ₃	2-OCH ₃	6	red

The compounds of Examples 4 to 6 and 8 to 14 are preferably after-treated in boiling dimethylformamide and milled.

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Application Example

Four parts of the pigment of Example 1 are added to 96 parts of a mixture of

50 parts of a 60% solution of coco aldehyde-melamine resin
of 32% fat content in xylene,

30 parts of a 50% melamine resin solution in butanol,

10 parts of xylene and

10 parts of ethylene glycol monoethylether

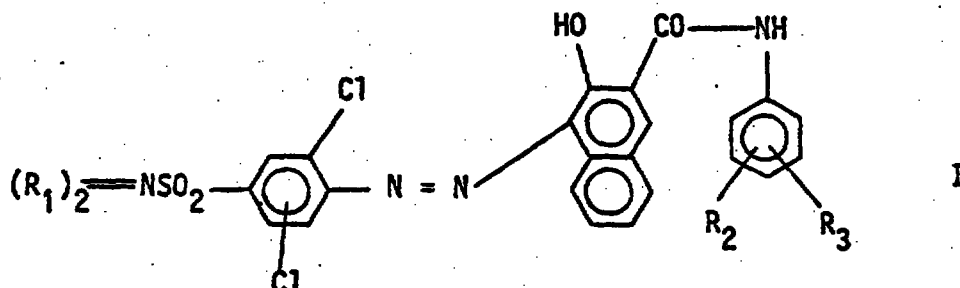
and the mixture ground for 24 hours in a ball mill. The dispersion obtained is sprayed on aluminium sheet, the spray coating allowed to dry in the air for 30 minutes and then stoved for 30 minutes at 120°. A scarlet film with very good light and weathering fastness is obtained.



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Claims

1. An azo compound of formula I



in which each R_1 , independently, is hydrogen; C_{1-8} alkyl; C_{2-3} alkyl substituted by up to two substituents selected from halogen, hydroxy, cyano, methoxy, ethoxy and alkoxy- C_{1-2} -carbonyl; or cyclohexyl, and each R_2 and R_3 , independently, is hydrogen, chlorine, bromine, methyl, methoxy or ethoxy.

2. An azo compound of Claim 1 wherein each R_1 is R_1' , where either both R_1' are identical and signify C_{1-2} alkyl or one R_1' is hydrogen and the other is C_{1-2} alkyl.

3. An azo compound according to Claim 1 or 2 wherein R_2 is R_2' , where R_2' is hydrogen, chlorine, methyl, methoxy or ethoxy.

4. An azo compound according to any one of the preceding claims, wherein R_3 is R_3' , where R_3' is hydrogen, chlorine or methyl.

5. An azo compound according to any one of the preceding claims, wherein R_2 is R_2'' , where R_2'' is methyl or methoxy.

6. An azo compound according to any one of the preceding claims, wherein R_3 is hydrogen.

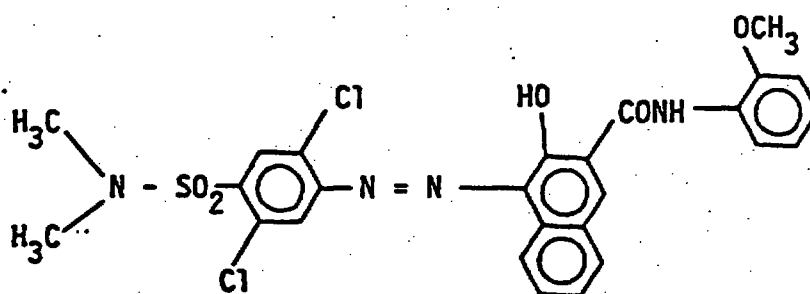
7. An azo compound of formula I according to Claim 1, wherein each R_1 is R_1' as defined in Claim 2, R_2 is R_2' as defined in Claim 5 and R_3 is R_3' as defined in Claim 6.

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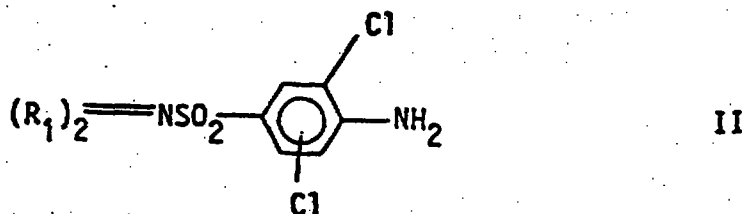
8. An azo compound of formula I according to Claim 1, wherein each R_1 is R_1' as defined in Claim 2, R_2 is R_2'' as defined in Claim 5 and R_3 is hydrogen.

9. A compound of formula

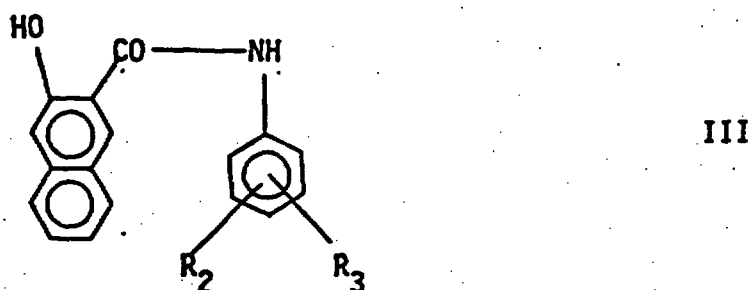


10. A compound as described in any one of Examples 2 to 43.

11. A process for the production of an azo compound of formula I, as stated in Claim 1, comprising coupling a diazo derivative of an amine of formula II



in which each R_1 is as defined in Claim 1, with a compound of formula III





in which R_2 and R_3 are as defined in Claim 1.

12. A process according to Claim 11, wherein the compound of formula I is submitted to a hot treatment in an organic solvent.

13. A process according to Claim 11 or 12, substantially as hereinbefore described, with reference to any one of Examples 1-43.

14. A process for pigmenting paper or viscose in the mass comprising employing as pigmenting agent a compound of any one of Claims 1 to 10.

15. A pigment printing or textile coating process wherein a compound of any one of Claims 1 to 10 is employed as pigmenting agent.

16. Pigmented surface coatings comprising, as pigment, a compound of any one of Claims 1 to 10.
