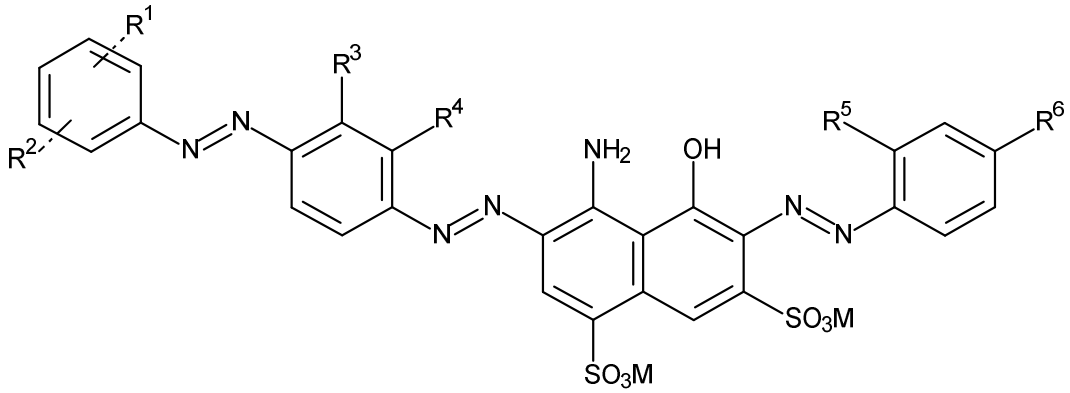
Patent claims:

1. Trisazo compounds of formula (I)



(I),

in which

R^1 is SO_3M or COOM, ~~and~~

R^2 is ~~hydrogen,~~ SO_3M or COOM,

~~with the proviso that R^1 is SO_3M when R^2 is hydrogen,~~

R^3 and R^4 independently of one another are hydrogen or CH_3,

R^5 and R^6 independently of one another are SO_3M, COOM or NO_2,

and

M is hydrogen, a monovalent metal cation, is ammonium or is alkylammonium which is mono- or polysubstituted identically or differently by C_1-C_4-alkyl.

2. Trisazo compounds according to Claim 1, characterized in that

R^1 is SO_3M or COOM,

~~and~~

R^2 is ~~hydrogen,~~ SO_3M or COOM,

~~with the proviso that R^1 is SO_3M when R^2 is hydrogen,~~

R^3 and R^4 independently of one another are hydrogen or CH_3,

and

R^5 and R^6 independently of one another are SO_3M, COOM or NO_2,

with the proviso that one of the radicals R^5 or R^6 is NO_2,

and

M is hydrogen, sodium, potassium, lithium, ammonium or alkylammonium which is mono- or polysubstituted identically or differently by C_1-C_2-alkyl.

3. Trisazo compounds according to Claim 1 or 2, characterized in that

R^1 is SO_3M or COOM,

~~and~~

R^2 is ~~hydrogen,~~ SO_3M or COOM,

~~with the proviso that R^1 is SO_3M when R^2 is hydrogen,~~

R^3 and R^4 independently of one another are hydrogen or CH_3,

and

R^5 and R^6 independently of one another are SO_3M, COOM or NO_2,

with the proviso that one of the radicals R^5 or R^6 is NO_2,

and

M is hydrogen, sodium, potassium, lithium, ammonium, trimethylammonium or triethylammonium.

4. Trisazo compounds according to any of Claims 1 to 3, characterized in that

R^1 is SO_3M or COOM,

~~and~~

R^2 is ~~hydrogen,~~ SO_3M or COOM,

~~with the proviso that R^1 is SO_3M when R^2 is hydrogen,~~

R^3 and R^4 are hydrogen or CH_3,

with the proviso that R^3 and R^4 are not both simultaneously hydrogen and are not both simultaneously CH_3,

R^5 and R^6 are SO_3M, COOM or NO_2,

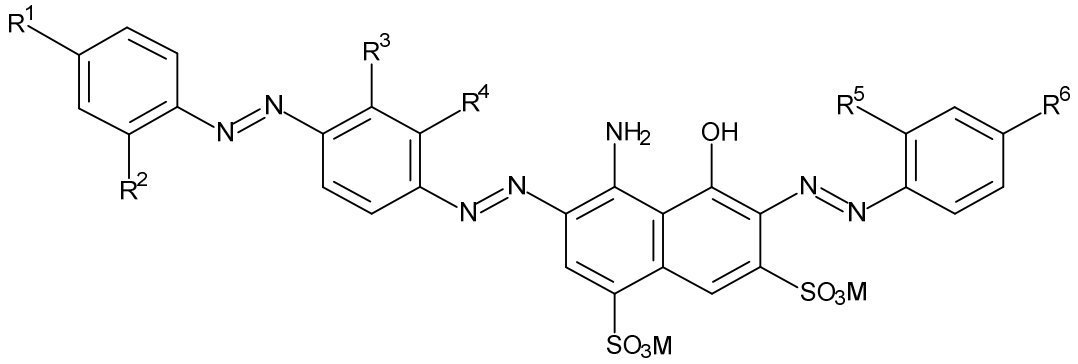
with the proviso that one of the radicals R^5 or R^6 is NO_2,

and

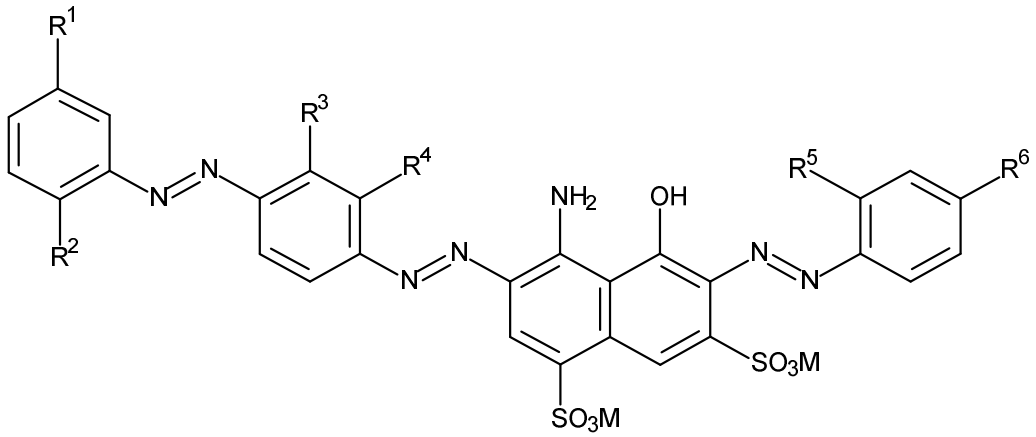
M is hydrogen, sodium, potassium, lithium, ammonium, trimethylammonium or triethylammonium.

5. Trisazo compounds according to any of Claims 1 to 4, characterized in that

they correspond to formulae (Ia) or (Ib)



(Ia)



(Ib)

in which

R^1 is SO_3M or COOM,

~~and~~

R^2 is ~~hydrogen,~~ SO_3M or COOM,

~~with the proviso that R^1 is SO_3M when R^2 is hydrogen,~~

R^3 and R^4 are hydrogen or CH_3,

with the proviso that R^3 and R^4 are not both simultaneously hydrogen and are not both simultaneously CH_3,

R^5 and R^6 are SO_3M, COOM or NO_2,

with the proviso that one of the radicals R^5 or R^6 is NO_2,

and

M is hydrogen, sodium, potassium, lithium, ammonium, trimethylammonium or triethylammonium.

6. Trisazo compounds according to any of Claims 1 to 5, characterized in that

R^1 is SO_3M,

R^2 is SO_3M,

R^3 and R^4 are hydrogen or CH_3,

with the proviso that R^3 and R^4 are not both simultaneously hydrogen and are not both simultaneously CH_3,

R^5 and R^6 are SO_3M, COOM or NO_2,

with the proviso that one of the radicals R^5 or R^6 is NO_2,

and

M is hydrogen, sodium, potassium, lithium, ammonium or triethylammonium.

7. Trisazo compounds according to any of Claims 1 to 6, characterized in that

R^1 is COOM,

R^2 is COOM,

R^3 and R^4 are hydrogen or CH_3,

with the proviso that R^3 and R^4 are not both simultaneously hydrogen and are not both simultaneously CH_3,

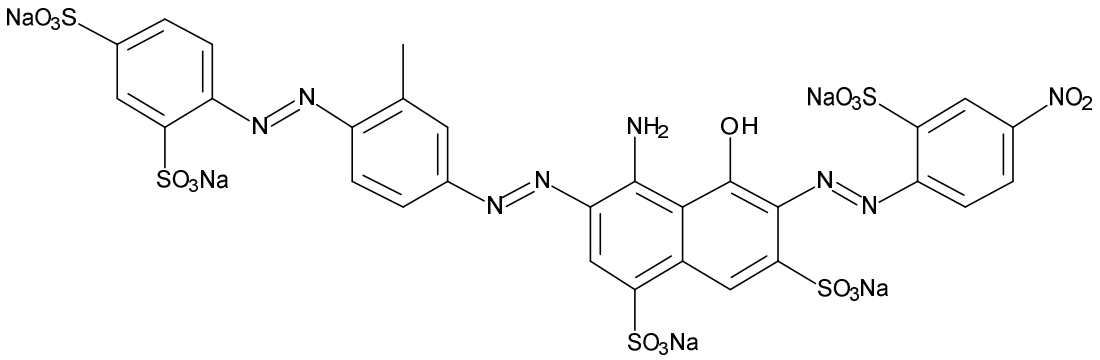
R^5 and R^6 are SO_3M, COOM or NO_2,

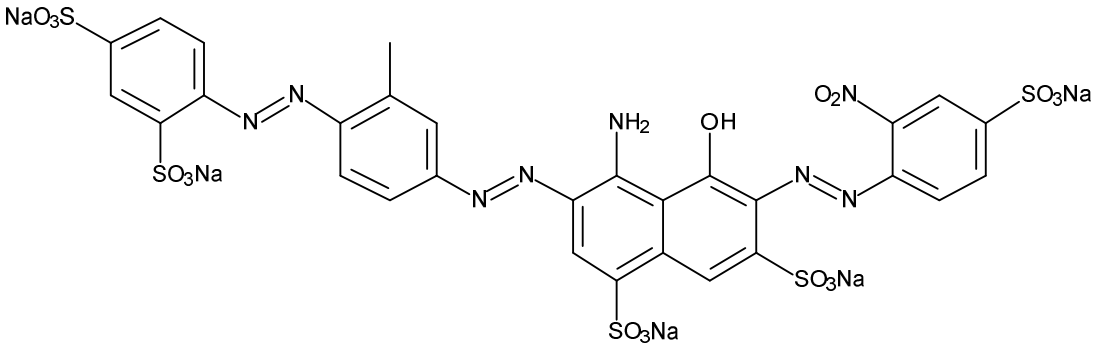
with the proviso that one of the radicals R^5 or R^6 is NO_2,

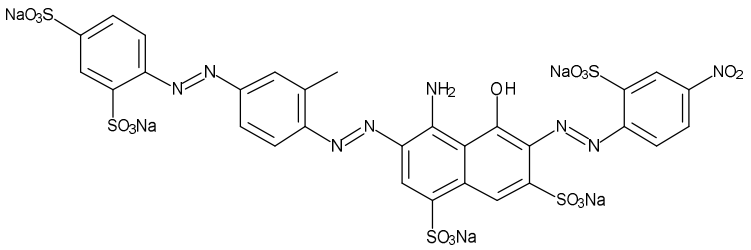
and

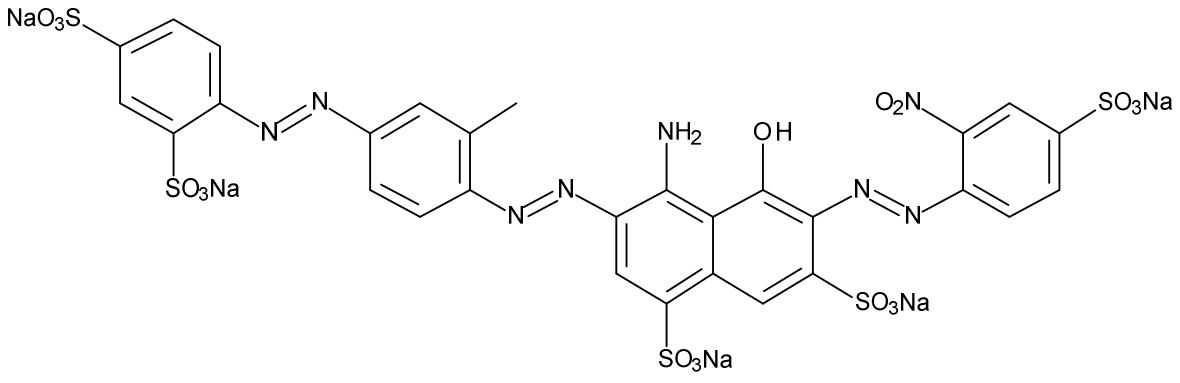
M is hydrogen, sodium, potassium, lithium, ammonium or triethylammonium.

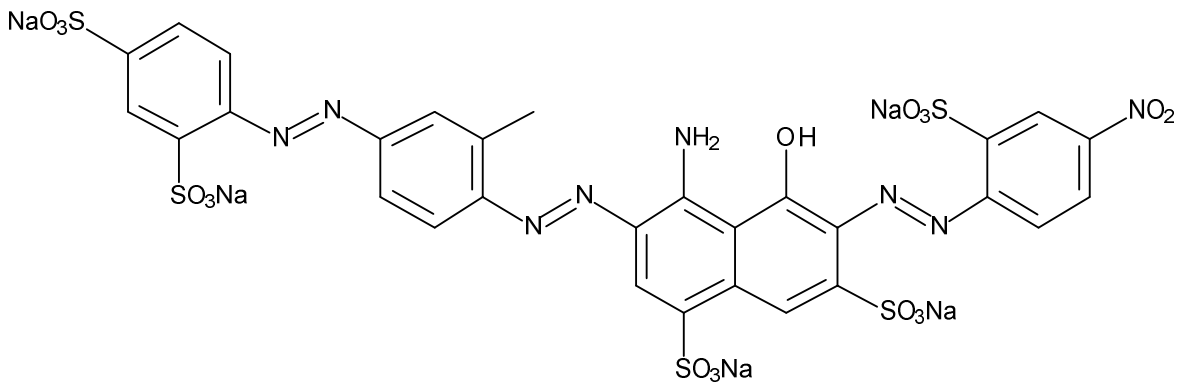
8. Trisazo compounds according to any of Claims 1 to 7, characterized in that they correspond to the formula

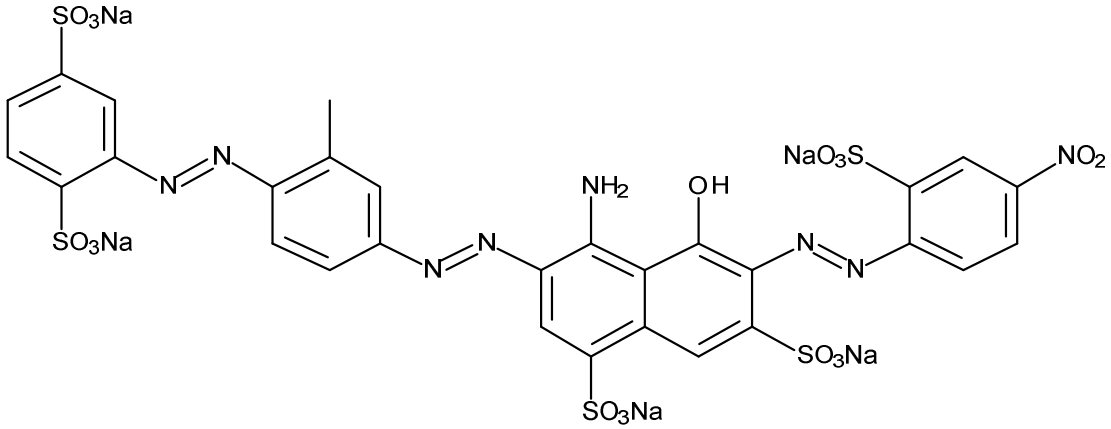


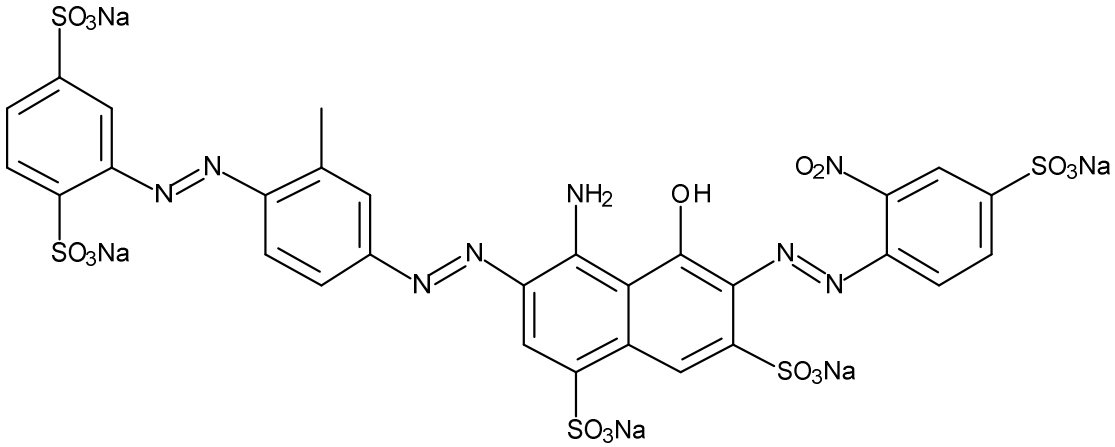


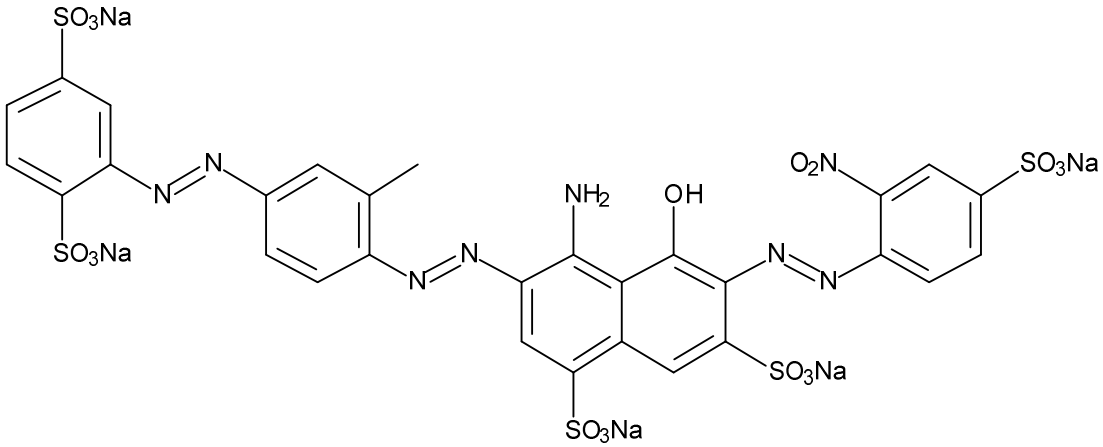


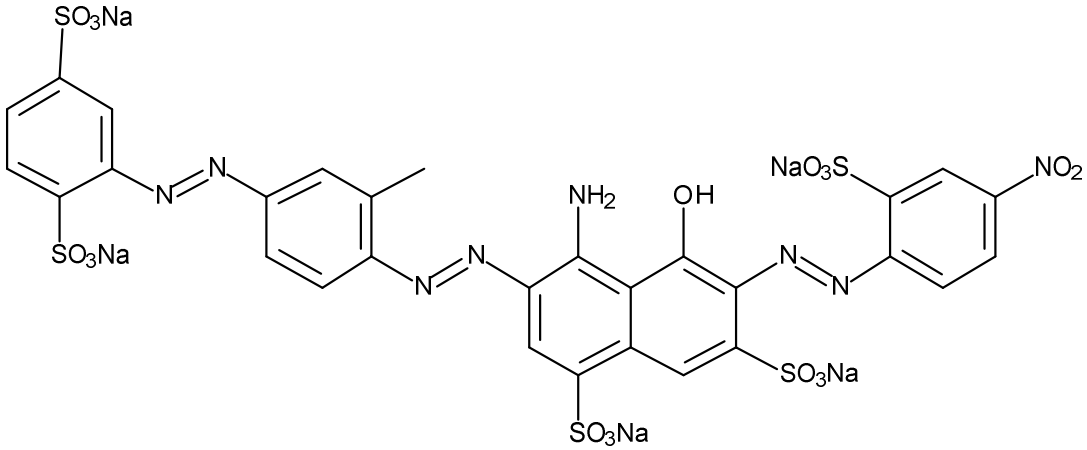


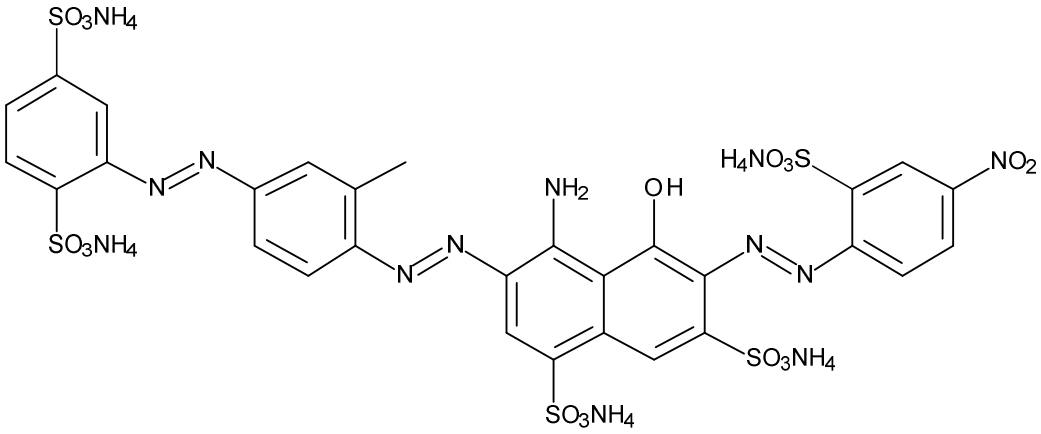

NaO3S
SO3Na
N=N
N=N
NH2
OH
NaO3S
NO2
N=N
SO3Na
SO3Na

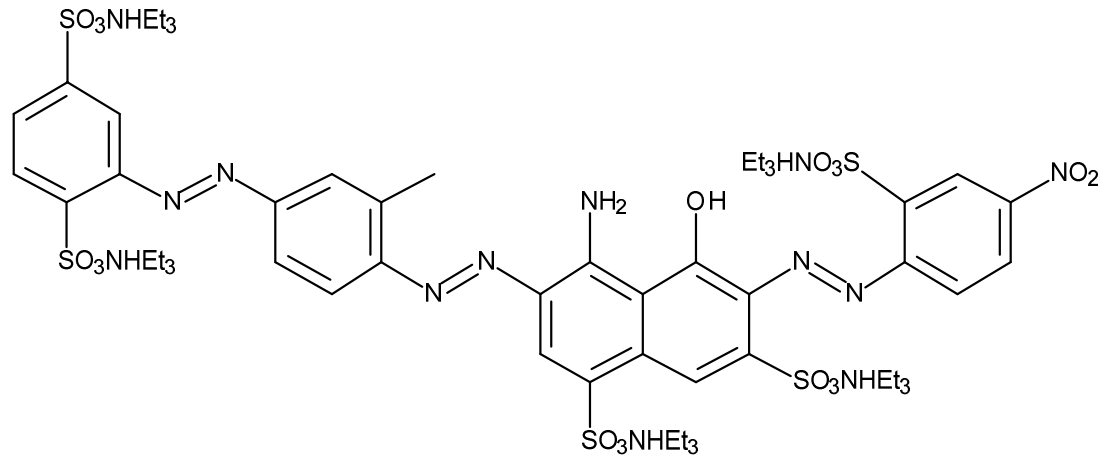

SO3Na
SO3Na
N=N
N=N
NH2
OH
NaO3S
NO2
N=N
SO3Na
SO3Na

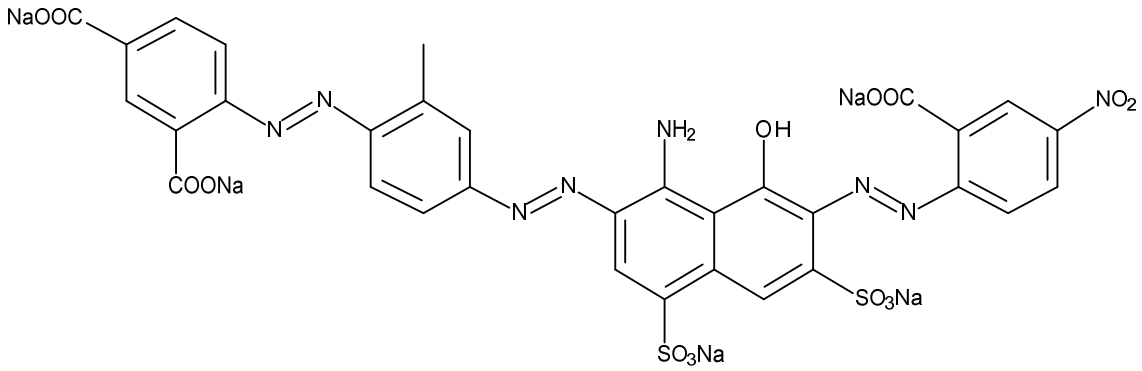

SO3Na
SO3Na
N=N
N=N
NH2
OH
O2N
SO3Na
N=N
SO3Na
SO3Na


SO3Na
SO3Na
N
N
NH2
OH
N
N
O2N
SO3Na
SO3Na
SO3Na

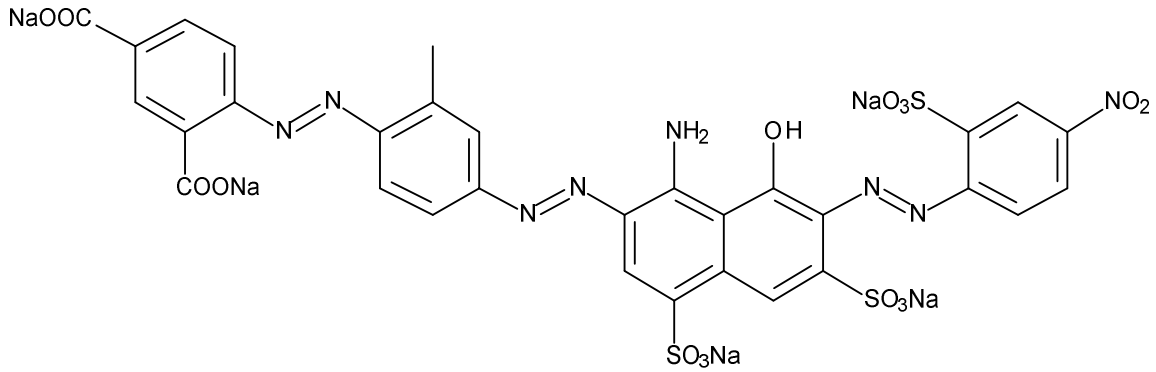

SO3Na
SO3Na
N
N
NH2
OH
N
N
NaO3S
NO2
SO3Na
SO3Na


SO3NH4
SO3NH4
N
N
NH2
OH
N
N
H4NO3S
NO2
SO3NH4
SO3NH4


SO3NHEt3
SO3NHEt3
N
N
N
N
NH2
OH
Et3HNO3S
NO2
N
N
SO3NHEt3
SO3NHEt3


NaOOC
COONa
N
N
N
N
NH2
OH
NaOOC
NO2
N
N
SO3Na
SO3Na

or


NaOOC
COONa
N
N
N
N
NH2
OH
NaO3S
NO2
N
N
SO3Na
SO3Na

.

9. Process for the dyeing and printing of cellulose-containing materials, animal hides, animal hair, eggshells, porous materials and metals, characterized in that the dye used is at least one triazo compound according to any of Claims 1 to 8.

10. Formulation containing at least one trisazo compound according to any of Claims 1 to 8.

11. Formulation according to Claim 10, characterized in that it is a liquid formulation.

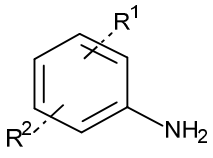
12. Formulation according to Claim 10 or 11, characterized in that it contains 0.5% to 25% by weight, preferably 1.0% to 15% by weight and particularly preferably 2.0% to 8.0% by weight of at least one trisazo compound according to any of Claims 1 to 8, in each case based on the overall formulation.

13. Formulation according to any of Claims 10 to 12, characterized in that it contains 40% to 99% by weight, preferably 70% to 95% by weight of water and optionally one or more additives from the group of N-methyl-2-pyrrolidone, 2-pyrrolidone, 2-hexylpyrrolidone, hydroxyethylpyrrolidone, 2-propanol, ethanediol, hexane-1,2-diol, butane-1,2-diol, trimethylolpropane, diethylene glycol, diethylene glycol monobutyl ether, triethylene glycol monobutyl ether, dipropylene glycol monobutyl ether, glycerol, butyl lactate, urea, sulfolane, glycol ethers and biocides in a total amount of from 0.01% to 50% by weight, preferably of from 0.1% to 20% by weight, based on the overall formulation.

14. Formulation according to any of Claims 10 to 13, characterized in that it contains 40% to 99% by weight, preferably 70% to 95% by weight of at least one solvent from the group of N-methyl-2-pyrrolidone, 2-pyrrolidone, 2-hexylpyrrolidone, hydroxyethylpyrrolidone, 2-propanol, ethanediol, hexane-1,2-diol, butane-1,2-diol, trimethylolpropane, diethylene glycol, diethylene glycol monobutyl ether, triethylene glycol monobutyl ether, dipropylene glycol monobutyl ether, glycerol, butyl lactate and optionally one or more additives from the group of urea, sulfolane, glycol ethers, biocides in a total amount of from 0.01% to 50% by weight, preferably of from 0.1% to 20% by weight, based on the overall formulation.

15. Use of a formulation according to any of Claims 10 to 14 as a recording fluid for inkjet printing, as a colourant in writing devices or in the production of colour filters for optical and optoelectronic applications.

16. Process for preparing trisazo compounds according to any of Claims 1 to 8, characterized in that at least one compound of formula (II)

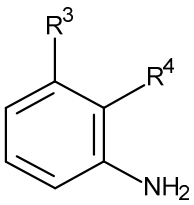


(II)

in which

R^1 and R^2 have the definitions specified in Claim 1,

is reacted with a diazotization reagent, and the reaction mixture obtained is subsequently reacted with at least one compound of formula (III)

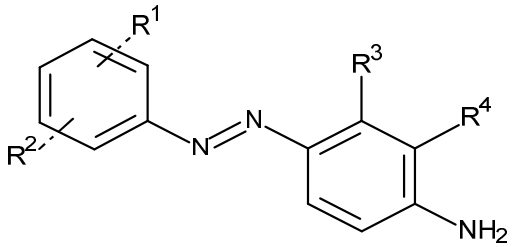


(III)

in which

R^3 and R^4 have the definitions specified in Claim 1,

to give the intermediate of formula (IV)

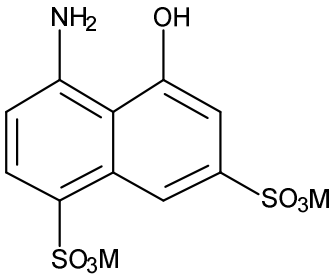


(IV)

in which

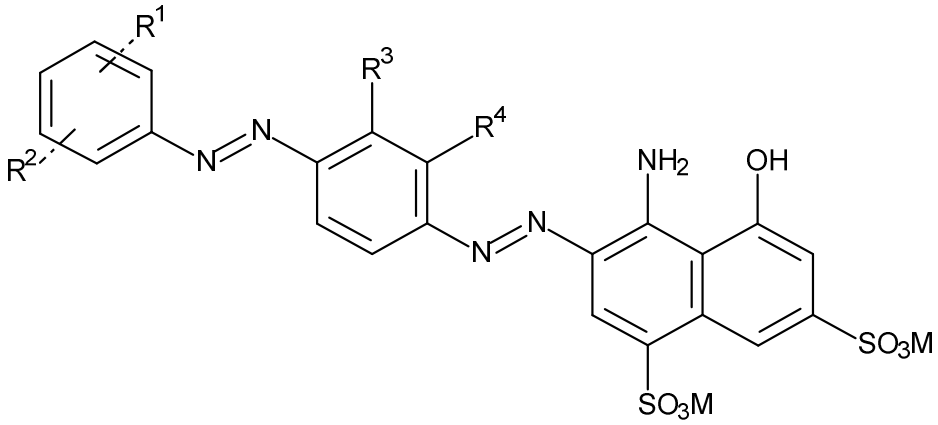
R^1, R^2, R^3 and R^4 have the definitions specified in Claim 1,

and the intermediate of formula (IV) is subsequently reacted with a diazotization reagent, and then the reaction mixture thus obtained is reacted with a compound of formula (V)



(V)

to give the intermediate of formula (VI)

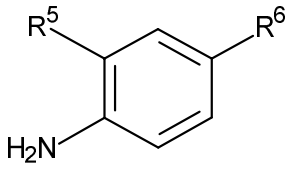


(VI)

in which

R^1, R^2, R^3 and R^4 have the definitions specified in Claim 1,

and subsequently the intermediate of formula (VI) is further reacted with the reaction product obtainable by reacting a compound of formula (VII)



(VII)

in which

R^5 and R^6 have the definitions specified in Claim 1,

with a diazotization reagent, and the trisazo compound of formula (I) that is formed is subsequently isolated by filtration of the reaction mixture.