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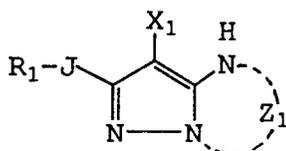
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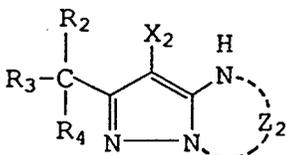
54 Silver halide color photographic light-sensitive material.

57 A silver halide color photographic light-sensitive material containing two kinds of magenta couplers is disclosed. They are represented by formulae :

Formula M-I



Formula M-II



defined in detail in the specification.

The silver halide color photographic light-sensitive material is capable of forming a photographic image of which the characteristic curve ascends with a gentle gradient from the low exposure region to the high exposure region and of forming photoprints of the same hue irrespective of the type of a printer employed.

BACKGROUND OF THE INVENTION

The present invention relates to a silver halide color photographic light-sensitive material, more specifically to a silver halide color photographic light-sensitive material improved in preservability and processing stability, and capable of providing the same quality irrespective of the type of a printer employed.

A silver halide color photographic light-sensitive material normally contains a yellow coupler and a magenta coupler and a cyan coupler in combination. As the magenta coupler, 5-pyrazolone-based couplers have been widely employed. The use of 5-pyrazolone-based couplers, however, is disadvantageously in respect of color reproduction, since a dye formed therefrom has an unfavorable secondary absorption at around 430 nm. Efforts were made to solve this problem, and pyrazolotriazole-based couplers were developed (see U.S. Patent No. 3,725,065, 3,810,761, 3,758,309 and 3,725,067).

Pyrazolotriazole-based couplers are capable of forming a dye which does not have such secondary absorption, and hence, allow light-sensitive materials to have improved color reproducibility. In addition, these couplers can develop colors very well and hardly deteriorate even in the presence of formalin.

Meanwhile, color negative films for normal photography, which are employed for photographing various objects under various conditions, are designed to have a wider latitude so that an image can be recorded even when the film is underexposed or overexposed, or so that as many image information as a photographer wants to record can be recorded. In color negative films, two or more silver halide emulsions which are sensitive to the same region of a spectrum but differ in sensitivity are employed, thereby allowing a variety of image information, ranging that in the high exposure region to that in the low exposure region, to be recorded.

Color negative films are required to have a characteristic curve [the axis of abscissas: $-\log E$ (E : exposure); the axis of ordinates: D (D : the density of an image)] which ascends from the low exposure region to the high exposure region by a gradual slope. When the above-mentioned pyrazolotriazole-based magenta coupler is used, it is hard to obtain such smooth characteristic curve, since the color developability of the coupler is too good. Typically, a characteristic curve of a negative film that contains this coupler is different from an ideal one in that the γ value is too high in the low exposure region and too low in the high exposure region, and an image density close to the maximum density is attained in the intermediate exposure region.

To avoid this problem, a development inhibitor releasing compound (hereinafter abbreviated as "DIR compound"), a compound that releases a development inhibitor during development, has been employed in combination with a pyrazolotriazole coupler. The use of a DIR compound, however, is defective since it causes the sensitivity of a film in the low exposure region to be lowered.

In addition, a pyrazolotriazole-based coupler has such a disadvantage that, when contained in a color negative film, it makes the hue of a photoprint, which is prepared by printing the negative film on color paper, to vary depending on the type of a printer employed.

Such hue variation is also caused by other conventional couplers, but the degree of variation is negligibly small in the case of other couplers. In contrast, hue variation caused by a pyrazolotriazole-based coupler is great enough to be practically problematic.

When a color negative image is printed on color paper by means of a printer, the green density, blue density and red density of the negative image are first measured by the detector, and an appropriate amount of exposure for printing is determined based on these measured density values. A wide variety of printers are commercially available, and the spectral sensitivity of the detector, which is employed for measuring the green density, blue density and red density of the negative image, varies from printer to printer. Hence, if different printers are used, the resulting photoprints will have different hues, even though the same negative is used.

Further, if the spectral absorption characteristics of a dye formed in a color negative film are variable depending on density or have an excessively small peak width at half height, this color negative film will have a poor resistance to a change in printing conditions.

In many of conventional pyrazolotriazole-based couplers, the spectral absorption characteristics of a dye formed therefrom tend to change pursuant to a variation in density. In printing a negative film containing such couplers on color paper, there will be a serious problem that the hue of the resulting photoprint varies depending on the type of a printer employed.

Under such circumstances, there has been a strong demand for a silver halide color photographic light-sensitive material containing a pyrazolotriazole-based coupler, which is capable of providing a photoprint improved in gradation and free from the above-mentioned hue variation problem.

It is known that a light-sensitive material containing a pyrazolotriazole-based coupler has such a defect that its photographic properties tend to change during long-term storage after production. In recent years, light-sensitive materials have been required to be much more improved in photographic properties. Specifically, sensitivity of a light-sensitive material is required neither to vary greatly from lot to lot nor to change with time. Sensitivity variation with time is a common problem to thin light-sensitive materials containing less silver, which

have come to be employed widely in these days. Such sensitivity variation with time is an urgent problem awaiting solution.

Further drawback of a pyrazolotriazole-based magenta coupler which should be overcome is that its processing stability is poor; the density of a dye formed therefrom tends to vary greatly with a change in the pH of a developer.

SUMMARY OF THE INVENTION

Under such circumstances, there has been a strong demand for a silver halide color photographic light-sensitive material free from the above problems.

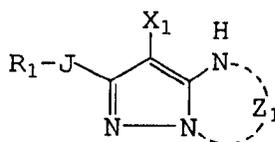
The primary object of the present invention is to provide a silver halide color photographic light-sensitive material capable of forming a photographic image of which the characteristic curve ascends with a gentle gradient from the low exposure region to the high exposure region.

The secondary object of the present invention is to provide a silver halide color photographic light-sensitive material capable of forming photoprints of the same hue irrespective of the type of a printer employed.

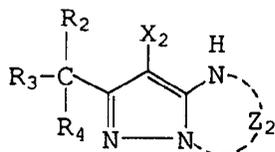
The other object of the present invention is to provide a silver halide color photographic light-sensitive material having high speed, low variation depending on the type of printers and improved preservability.

The silver halide color photographic light-sensitive material of the present invention comprises photographic component layers including blue-sensitive silver halide emulsion layer, green-sensitive silver halide emulsion layer and red-sensitive silver halide emulsion layer, wherein said green-sensitive layers contains at least one magenta coupler represented by formula M-I, at least one magenta coupler represented by formula M-II.

Formula M-I



Formula M-II



wherein R_1 represents a hydrogen atom, an alkyl group or an aryl group; R_2 , R_3 and R_4 each represent a hydrogen atom, an alkyl group or an aryl group which may combine with each other to form a saturated or unsaturated ring, provided that at least two of them are not hydrogen atoms; J represents a methylene group, an oxygen atom or a sulfur atom; X_1 and X_2 each represent a hydrogen atom or a group capable of being released by a reaction with an oxidized developing agent; and Z_1 and Z_2 each represent a group of non-metallic atoms necessary for forming a nitrogen-containing heterocyclic ring which may have a substituent.

The silver halide color photographic light-sensitive material of the present invention may have plurality of blue-sensitive silver halide emulsion layers, green-sensitive silver halide emulsion layers or red-sensitive silver halide emulsion layers. In such case the magenta coupler represented by formula M-I, the magenta coupler represented by formula M-II may be contained in at least one of the green-sensitive silver halide emulsion layers.

One embodiment of the silver halide color photographic light-sensitive material the invention further comprises in the green-sensitive silver halide emulsion layer at least one compound represented by formula I:

Formula I



10 wherein R_{40} , R_{50} and R_{60} each represent an aliphatic group or an aromatic group; and 1, m and n each represent 0 or 1, provided that at least one of them is 0.

The other embodiment of the silver halide color photographic light-sensitive material the invention comprises, further to the magenta coupler represented by formula M-I and the magenta coupler represented by formula M-II in the green-sensitive silver halide emulsion layer, at least one compound represented by formula II:



wherein R_A and R_B , whether identical or different, each represent a hydrogen atom, an alkyl group, a cycloalkyl group, an alkenyl group, a cycloalkenyl group, an alkynyl group, an aryl group, a heterocyclic group, an alkoxy group, an aryloxy group, a heterocyclic oxy group or



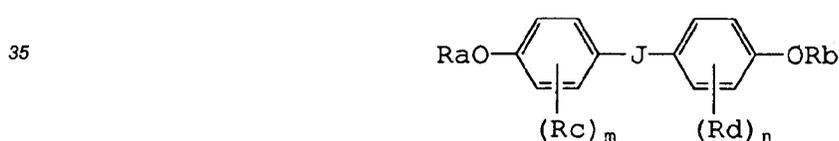
25 wherein R_C and R_D each represent a hydrogen atom, an alkyl group or an aryl group.

The other embodiment of the invention comprises, further to the magenta coupler represented by formula M-I, the magenta coupler represented by formula M-II at least one compound represented by formula A-I:



30 wherein J represents a divalent organic group; Y represents an alkyl group, a cycloalkyl group, an aryl group, an alkenyl group, an alkynyl group, a cycloalkenyl group or a heterocyclic group.

The other embodiment of the invention comprises, further to the magenta coupler represented by formula M-I, the magenta coupler represented by formula M-II at least one compound represented by formula A-II:



40 wherein R_a and R_b each represent a hydrogen atom, an alkyl group, a cycloalkyl group, an alkenyl group or an aryl group; R_c and R_d each represent a halogen atom, an alkyl group, a cycloalkyl group, an alkenyl group, an alkoxy group, an aryl group, an aryloxy group, an alkylthio group, an arylthio group, an acyl group, an acylamino group, a sulfonyl group, a sulfonamide group or a hydroxy group; m and n each represent an integer of 0 to 4, when m is an integer of 2 to 4, R_c s may be either identical with or different from each other, and when n is an integer of 2 to 4, R_d s may be either identical with or different from each other; and J represents a divalent bonding group.

DETAILED DESCRIPTION OF THE INVENTION

50 The magenta coupler represented by formula M-I will be explained below.

In formula M-I, R_1 represents a hydrogen atom, an alkyl group or an aryl group.

The alkyl group represented by R_1 may preferably be a straight-chain or branched alkyl with 1 to 32 carbon atoms.

Phenyl is preferable as the aryl group represented by R_1 .

55 J represents a methylene group, an oxygen atom or a sulfur atom.

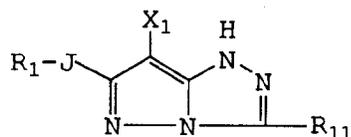
X_1 and X_2 each represent a hydrogen atom or a group capable of being released by a reaction with an oxidized color developing agent. Examples of such group include a halogen atom (e.g. chlorine, bromine, fluorine), an alkoxy group, an aryloxy group, a heterocyclic oxy group, an acyloxy group, a sulfonyloxy group, an alkoxy-

ycarbonyloxy group, an aryloxy carbonyl group, an alkyloxyloxy group, an alkoxyoxyloxy, an alkylthio group, an arylthio group, a heterocyclic thio group, an alkyloxythiocarbonylthio group, an acylamino group, a sulfonamide group, a nitrogen-containing heterocyclic group (combined with a nitrogen atom), an alkyloxy carbonylamino group, an aryloxy carbonylamino group and a carboxyl group. Of them, a halogen atom, in particular, a chlorine atom, is preferable.

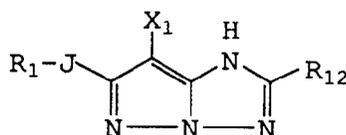
Z₁ and Z₂ each represent a group of non-metallic atoms necessary for forming a nitrogen-containing heterocyclic ring. The nitrogen-containing heterocyclic ring may be a pyrazole ring, an imidazole ring, a triazole ring or a tetrazole ring.

Representative examples of the magenta coupler represented by M-I are given below.

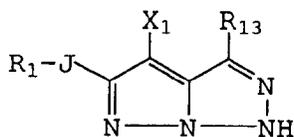
Formulae M-Ia



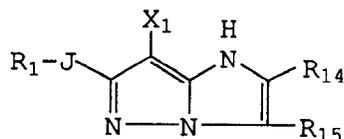
Formulae M-Ib



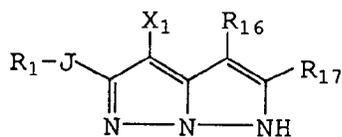
Formulae M-Ic



Formulae M-Id

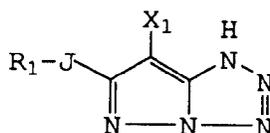


Formulae M-Ie



Formulae M-I f

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10 In formulae M-Ia to M-Ib, R_1 has the same meaning as R_1 in formula M-I, and R_{11} to R_{17} each represent a hydrogen atom or a substituent.

There is no restriction as to the kind of a substituent represented by any one of R_{11} to R_{17} , but suitable substituents include an alkyl group, an aryl group, an anilino group, an acylamino group, a sulfonamide group, an alkylthio group, an arylthio group, an alkenyl group, a cycloalkyl group, a halogen atom, a cycloalkenyl group, an alkynyl group, a heterocyclic ring, a sulfonyl group, a sulfinyl group, a phosphoryl group, an acyl group, a carbamoyl group, a sulfamoyl group, a cyan group, an alkoxy group, an aryloxy group, a heterocyclic oxy group, a siloxy group, an acyloxy group, a carbamoyloxy group, an amino group, an alkylamino group, an imido group, an ureido group, a sulfamoylamino group, an alkoxy-carbonylamino group, an aryloxy-carbonylamino group, an alkoxy-carbonyl group, an aryloxy-carbonyl group, a heterocyclic thio group, a spiro compound residue and a bridged hydrocarbon compound residue.

20 Explanation will be made of the groups represented by any one of R_{11} to R_{17} . The alkyl group may preferably be a straight-chain or branched alkyl with 1 to 32 carbon atoms.

Phenyl is preferable as the aryl group.

Examples of the acylamino group include alkylcarbonylamino and arylcarbonylamino.

Examples of the sulfonamide group include alkylsulfonylamino and arylsulfonylamino.

25 The alkyl component of the alkylthio group and the aryl component of the arylthio group may respectively be the alkyl group and the aryl group as mentioned above.

The alkenyl group may preferably be a straight-chain or branched alkenyl with 2 to 32 carbon atoms, and the cycloalkenyl group may preferably be one with 3 to 12, still preferably 5 to 7, carbon atoms.

The cycloalkenyl group may preferably be one with 3 to 12, still preferably 5 to 7, carbon atoms.

30 The sulfonyl group may be alkylsulfonyl or arylsulfonyl; the sulfonyl group may be alkylsulfinyl or arylsulfinyl; the phosphoryl group may be alkylphosphonyl, alkoxyphosphonyl, aryloxyphosphonyl or arylphosphonyl; the acyl group may be alkylcarbonyl or arylcarbonyl; the carbamoyl group may be alkylcarbamoyl or arylcarbamoyl; the sulfamoyl group may be alkylsulfamoyl or arylsulfamoyl; the acyloxy group may be alkylcarbonyloxy or arylcarbonyloxy; the carbamoyloxy group may be alkylcarbamoyloxy or arylcarbamoyloxy; the ureido group may be alkylureido or arylureido; sulfamoylamino group may be alkylsulfamoylamino or arylsulfamoyl; the heterocyclic group may preferably be a 5- to 7-membered ring such as 2-furyl, 2-thienyl, 2-pyrimidinyl or 2-benzothiazolyl; the heterocyclic oxy group may preferably be a 5- to 7-membered heterocyclic oxy group such as 3,4,5,6-tetrahydropyran-2-yl or 1-phenyltetrazole-5-yl; the heterocyclic thio group may preferably be a 5- to 7-membered heterocyclic thio group such as 2-pyridylthio, 2-benzthiazolylthio, 2,4-diphenoxy-1,3,5-triazole-6-thio; the siloxy group may be trimethylsiloxy, triethylsiloxy or dimethylbutylsiloxy; the imido group may be succinimido, 3-heptadecylsuccinimido, phthalimido or glutarimido; the spiro compound residue may be spiro[3.3]heptane-1-yl; the bridged hydrocarbon compound residue may be bicyclo[2.2.1]heptane-1-yl, tricyclo[3.3.1.1^{3,7}]decane-1-yl or 7,7-dimethyl-bicyclo[2.2.1]heptane-1-yl.

45 Of the magenta couplers represented by formulae M-I, those represented by formula M-Ia or M-Ib are especially preferred.

Of the substituents represented by any one of R_{11} to R_{17} , those represented by formula M-Ig are most preferable.

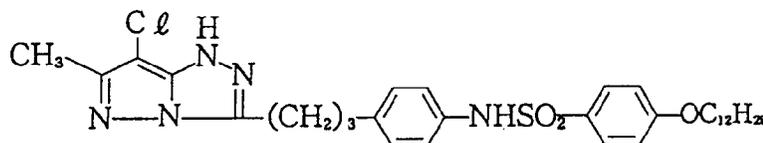
Formula M-Ig $R_{18}-CH_2-$

wherein R_{18} has the same meaning as R_{11} to R_{17} . A hydrogen atom or an alkyl group is preferable as R_{18} .

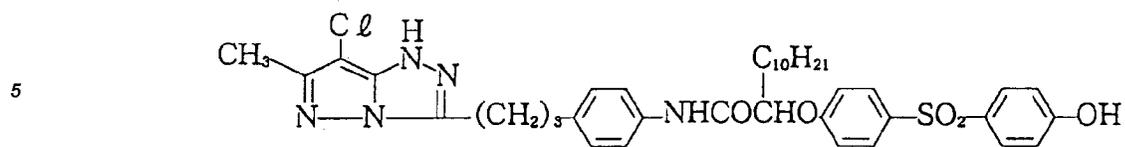
50 Representative examples of the magenta coupler represented by formula M-I are given below.

M - I - 1

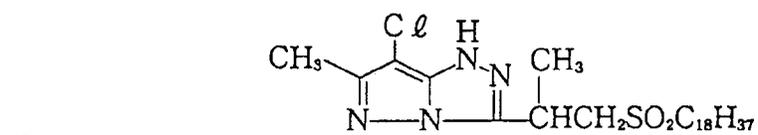
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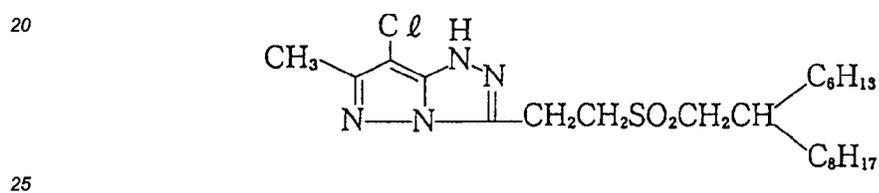
M - I - 2



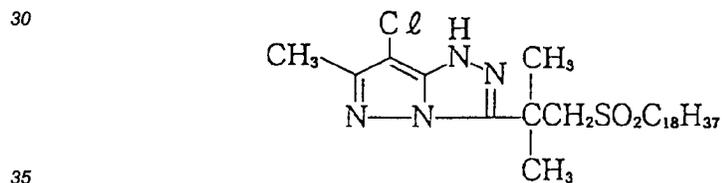
M - I - 3



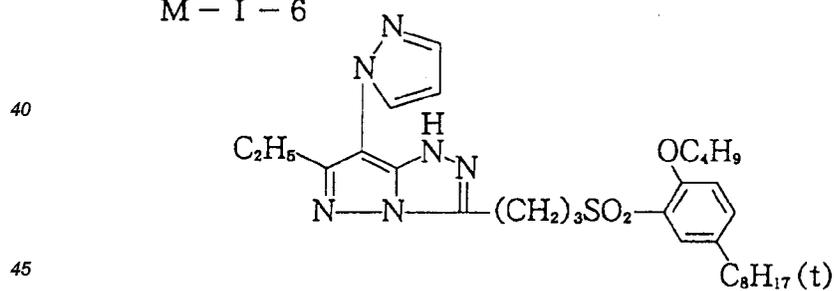
M - I - 4



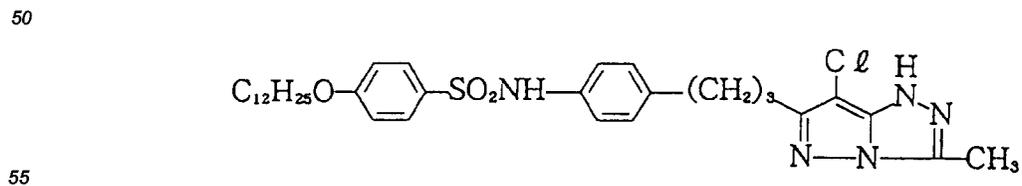
M - I - 5



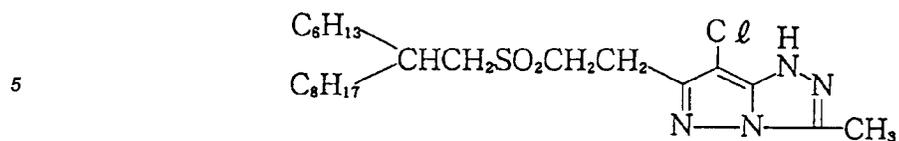
M - I - 6



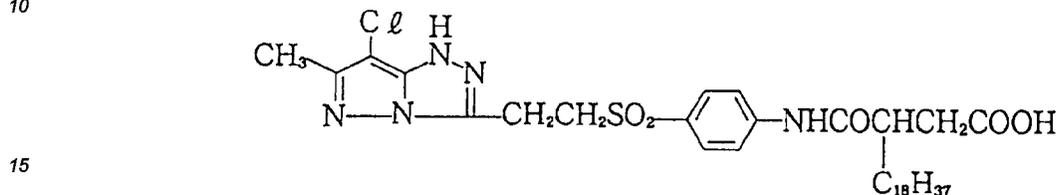
M - I - 7



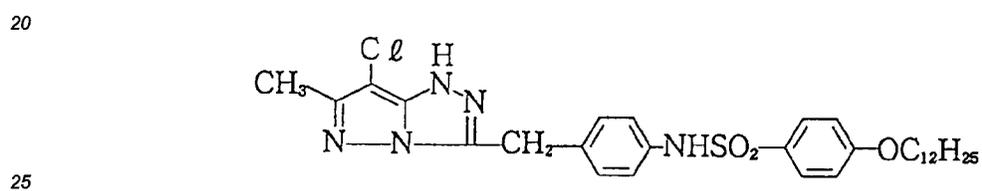
M - I - 8



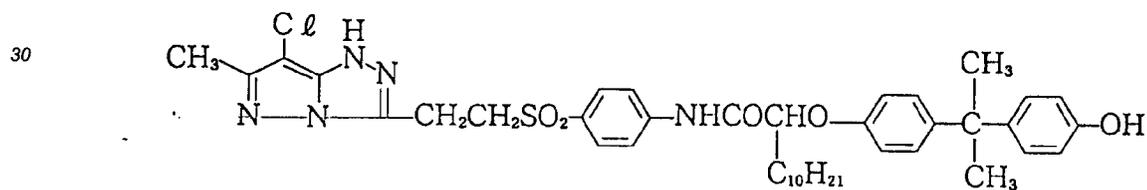
M - I - 9



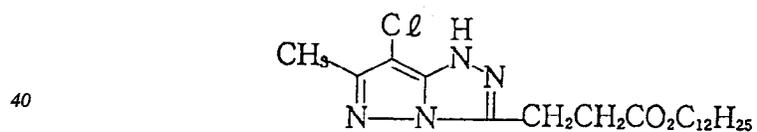
M - I - 10



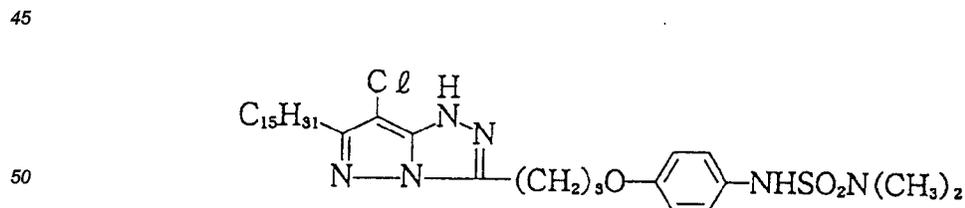
M - I - 11



M - I - 12



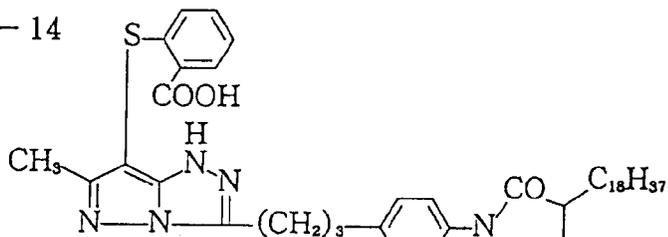
M - I - 13



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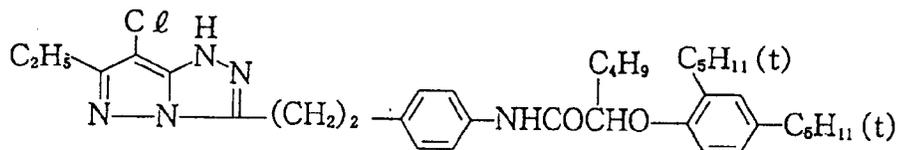
M - I - 14

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M - I - 15

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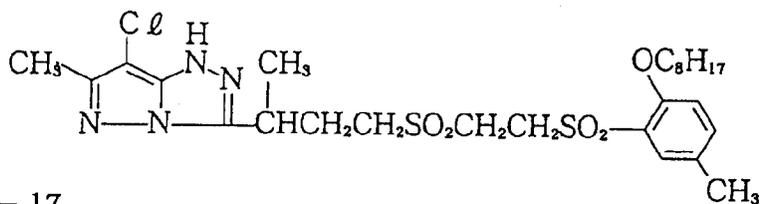


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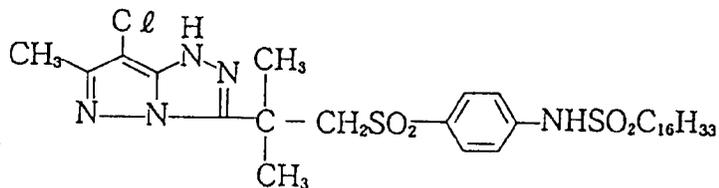
M - I - 16

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M - I - 17

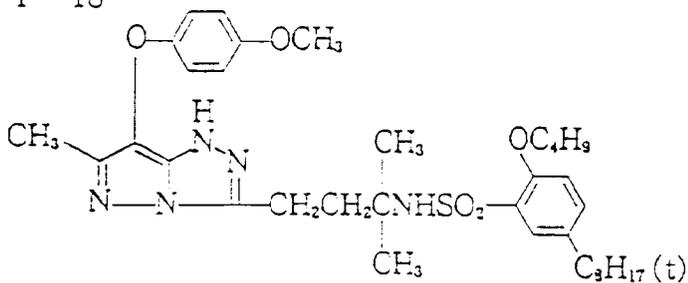
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M - I - 18

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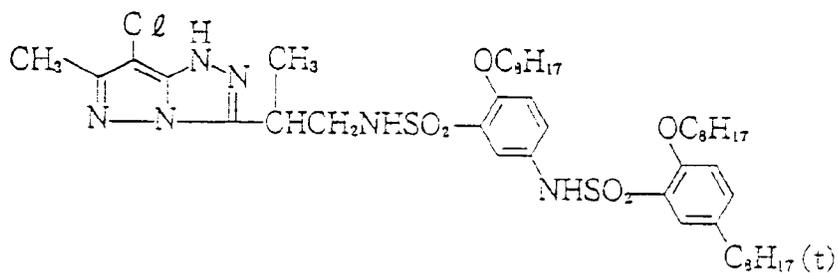
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M - I - 19

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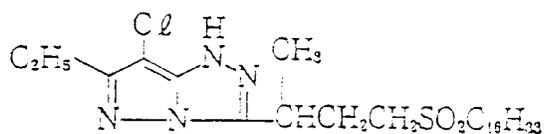
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M - I - 20

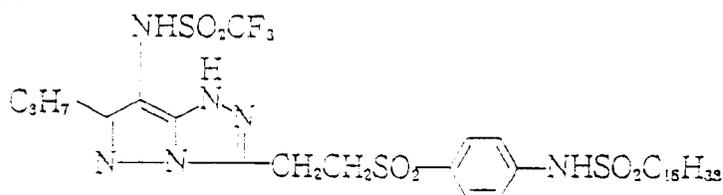
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M - I - 21

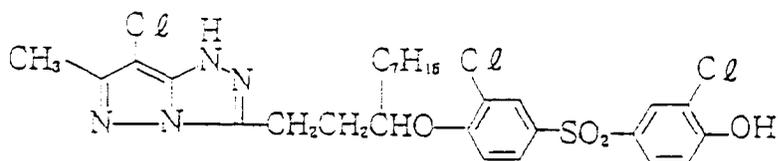
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M - I - 22

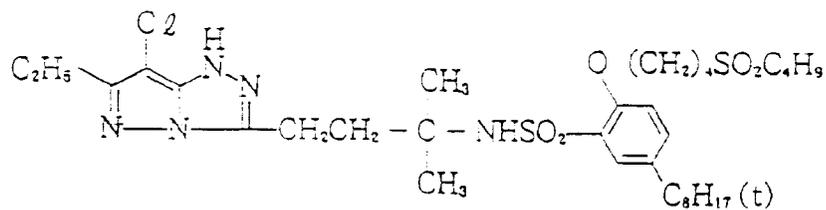
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M - I - 23

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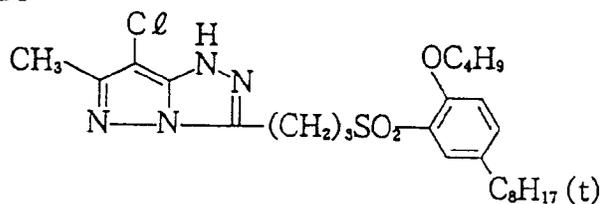
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M - I - 24

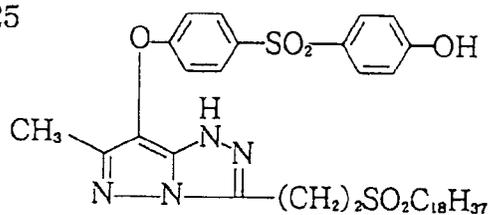
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M - I - 25

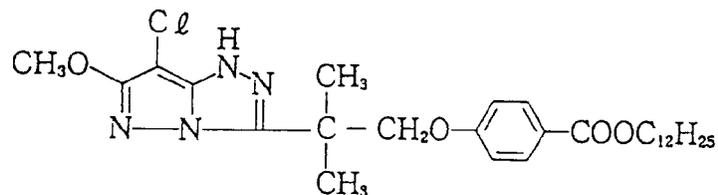
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M - I - 26

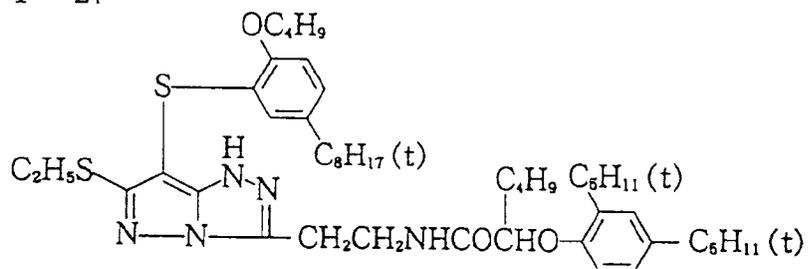
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M - I - 27

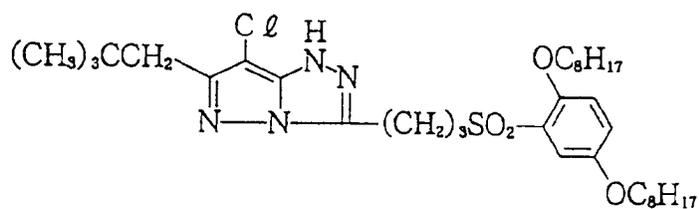
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M - I - 28

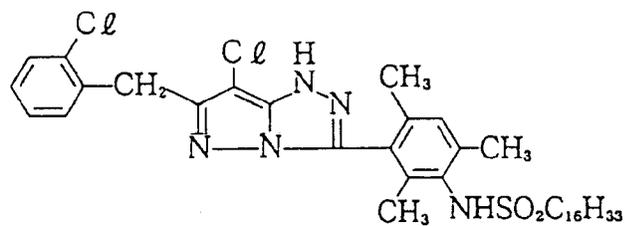
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M - I - 29

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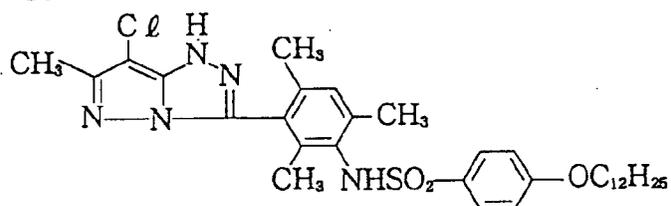


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M - I - 30

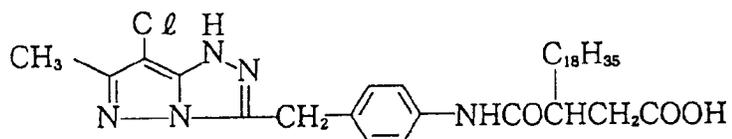
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M - I - 31

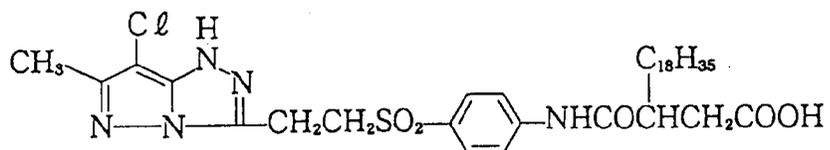
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M - I - 32

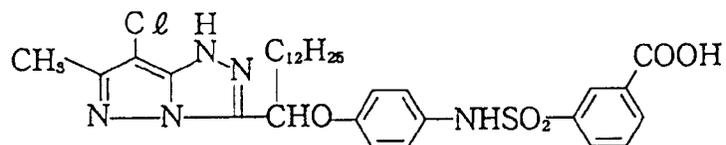
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M - I - 33

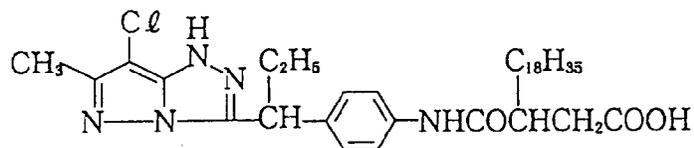
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M - I - 34

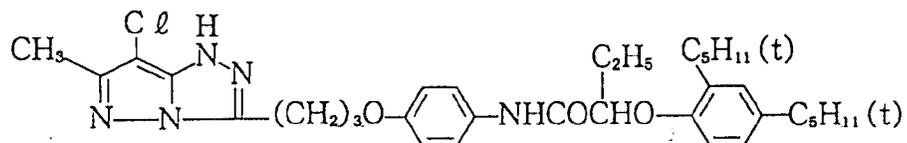
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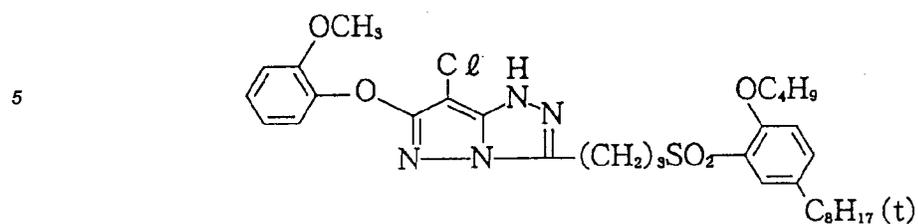
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M - I - 35

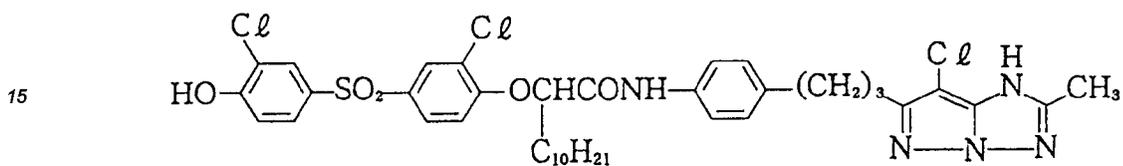
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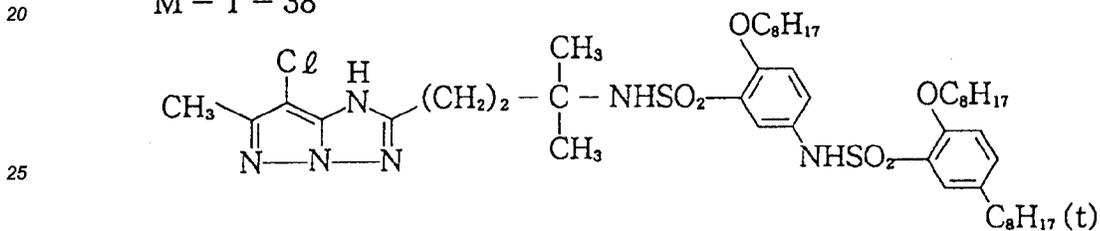
M - I - 36



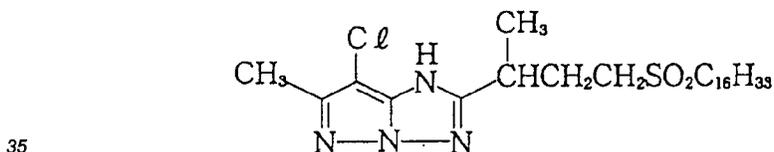
M - I - 37



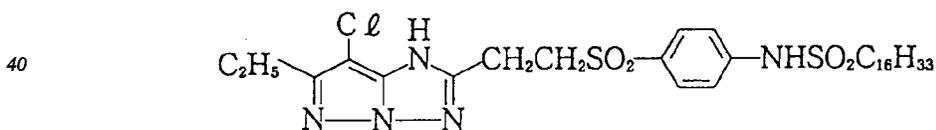
M - I - 38



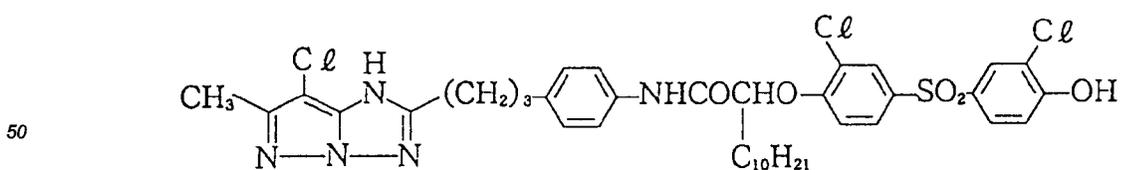
M - I - 39



M - I - 40

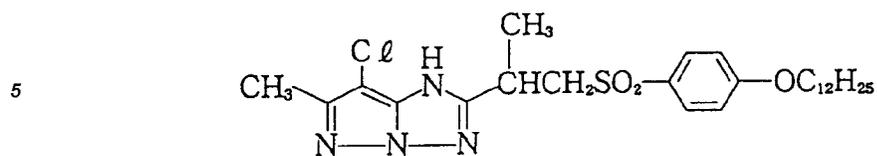


M - I - 41



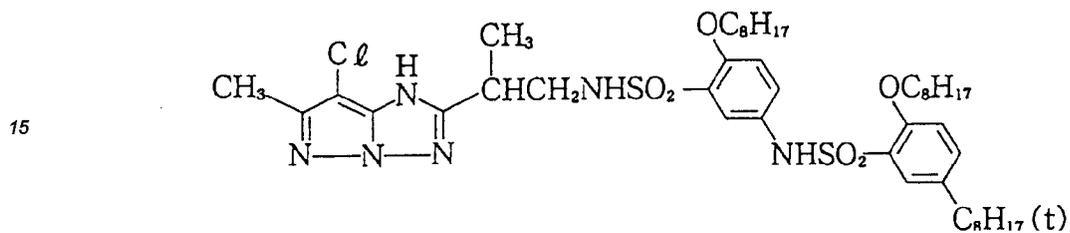
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M - I - 42



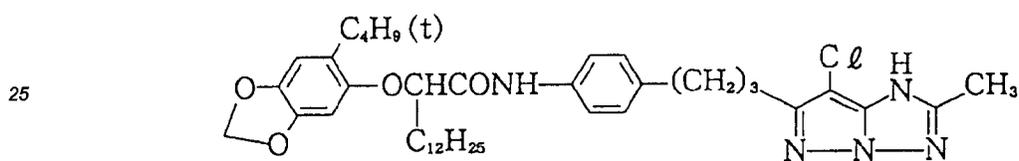
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M - I - 43



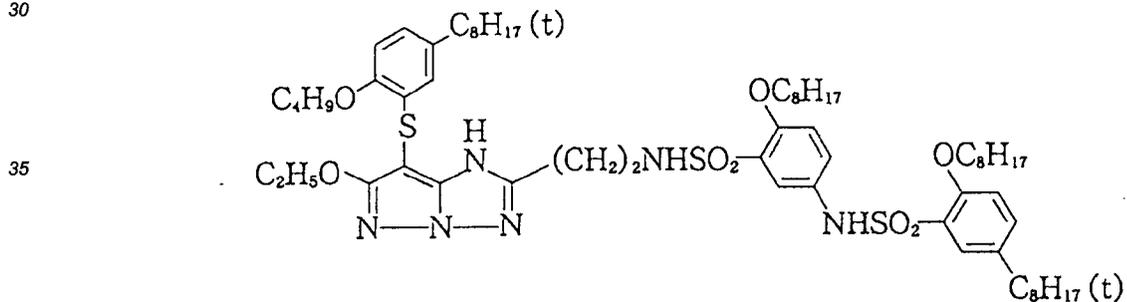
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M - I - 44



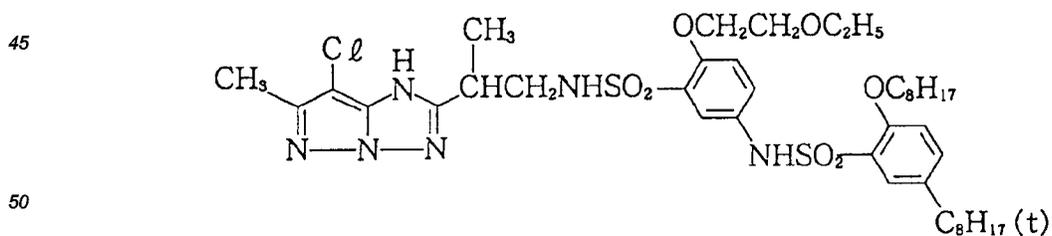
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M - I - 45



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M - I - 46

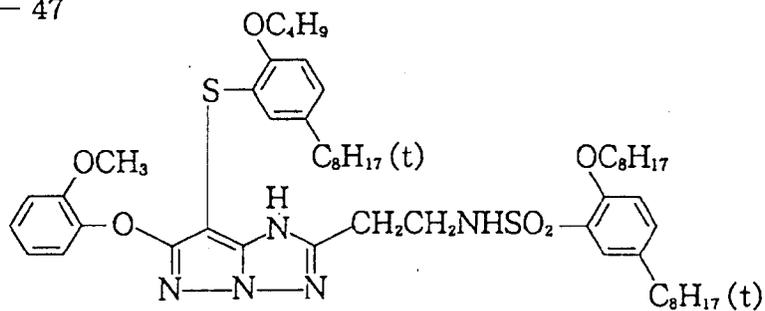


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M - I - 47

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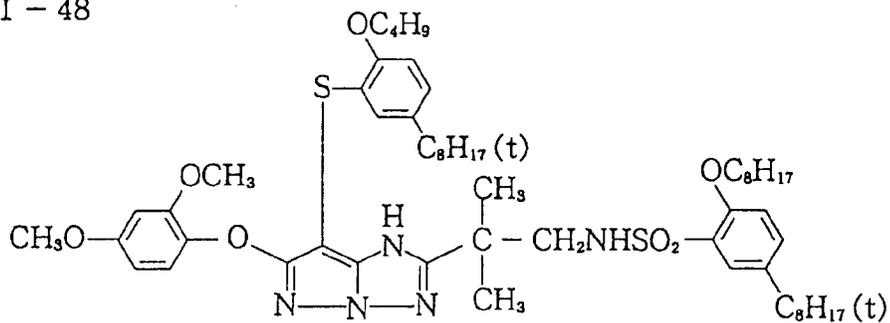


M - I - 48

15

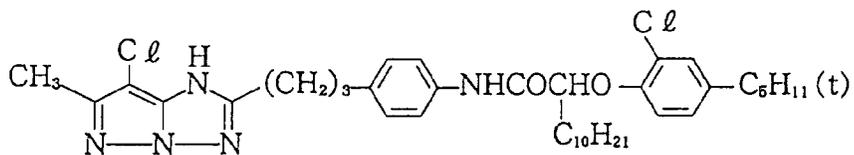
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M - I - 49

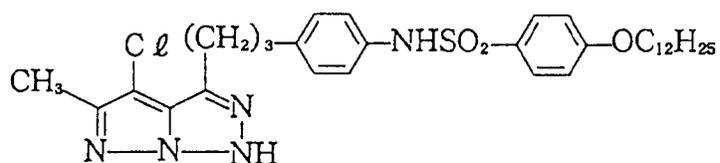
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M - I - 50

35

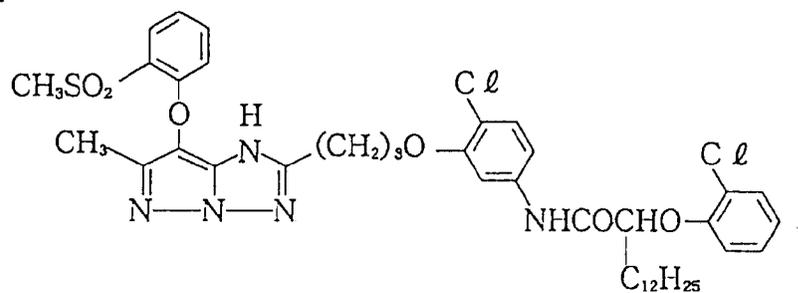
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M - I - 51

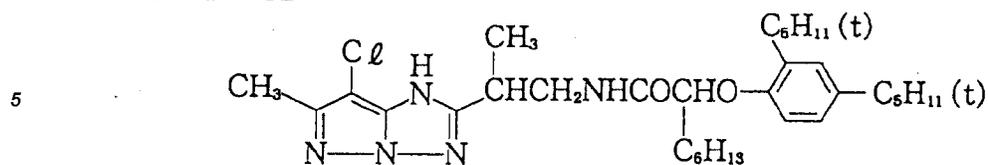
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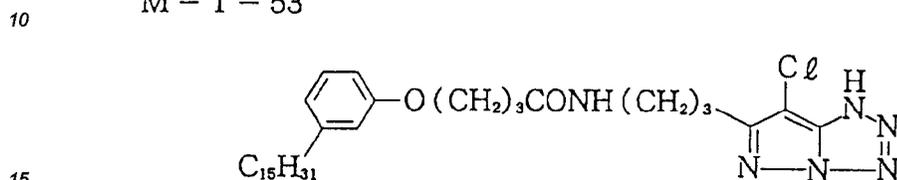


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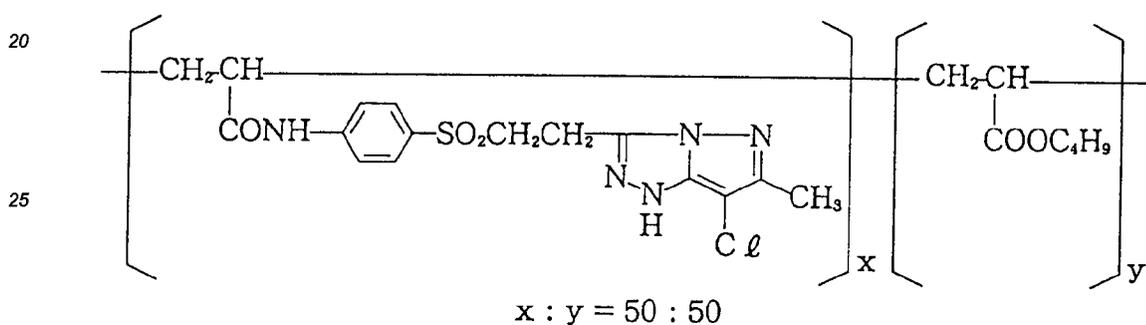
M - I - 52



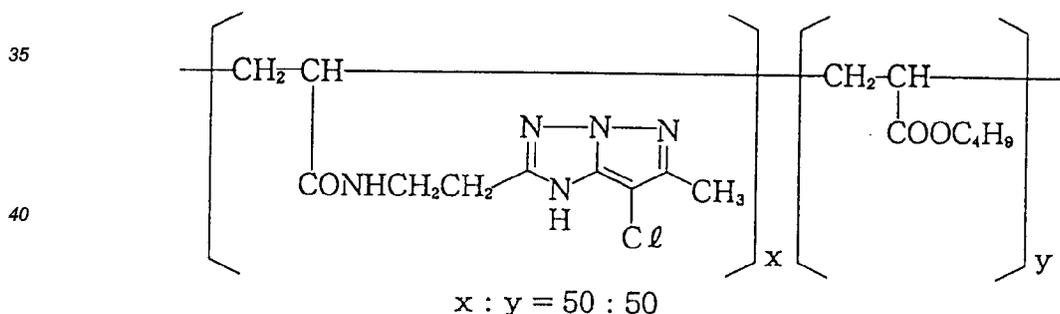
M - I - 53



M - I - 54



M - I - 55



45 An explanation will be made on the magenta coupler represented by formula M-II.

In formula M-II, R_2 , R_3 and R_4 each represent a hydrogen atom, an alkyl group or an aryl group. Two or all of them may combine with each other to form a saturated or unsaturated ring. At least two of them are not hydrogen atoms.

The alkyl group represented by R_2 , R_3 or R_4 may preferably be a straight-chain or branched alkyl group with 1 to 32 carbon atoms. Phenyl is preferable as the aryl group represented by R_2 , R_3 or R_4 .

The saturated or unsaturated ring formed by the combination of two or all of R_2 , R_3 and R_4 may be cycloalkane, cycloalkene, a heterocyclic ring, a benzene ring or a bridged hydrocarbon ring.

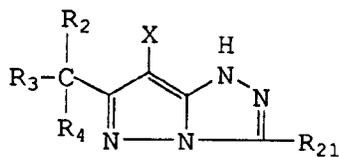
X_2 and Z_2 respectively have the same meaning as X_1 and Z_1 in formula M-I.

Specific examples of the magenta coupler represented by formula M-II are given below.

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Formulae M-IIa

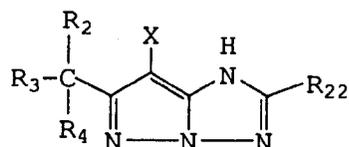
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Formulae M-IIb

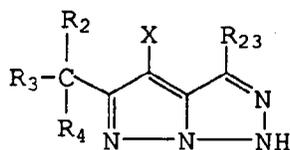
15



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Formulae M-IIc

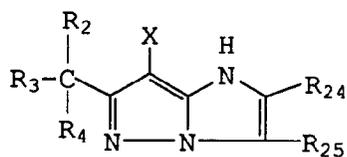
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Formulae M-IId

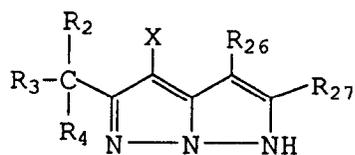
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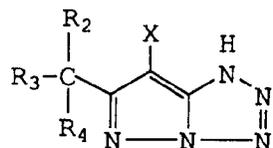
Formulae M-IIe

45



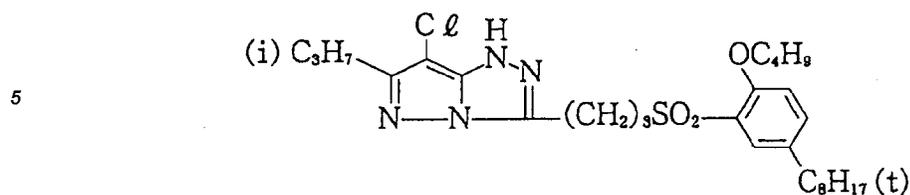
50

Formulae M-IIf



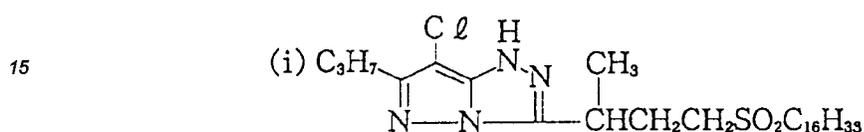
55 In formulae M-IIa to M-IIf, R₂₁ to R₂₇ have the same meanings as R₁₁ to R₁₇. Representative magenta couplers of formula M-II are exemplified below.

M - II - 1



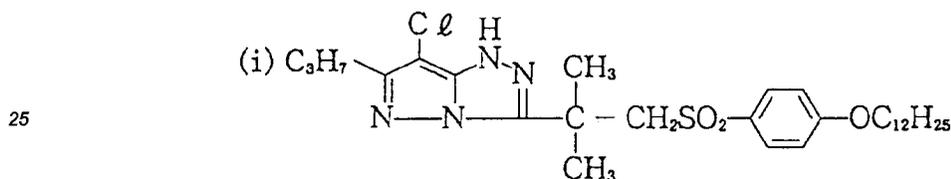
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M - II - 2



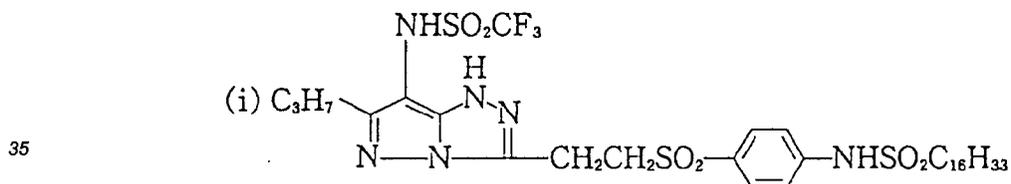
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M - II - 3



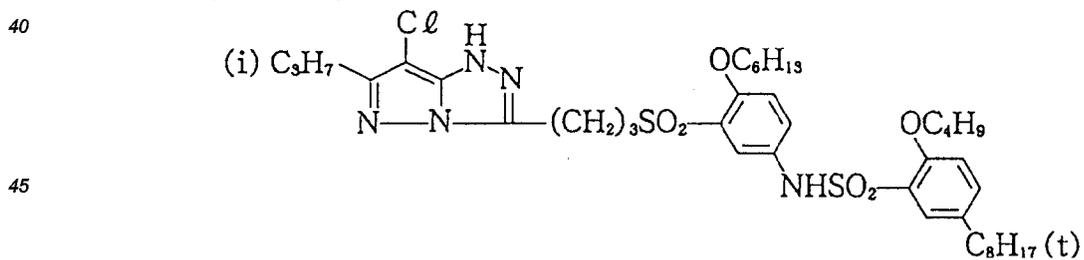
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M - II - 4



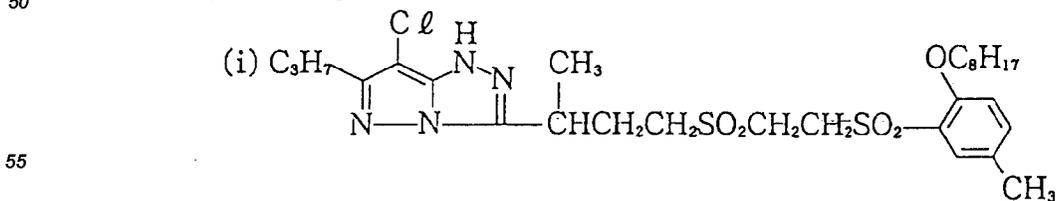
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M - II - 5

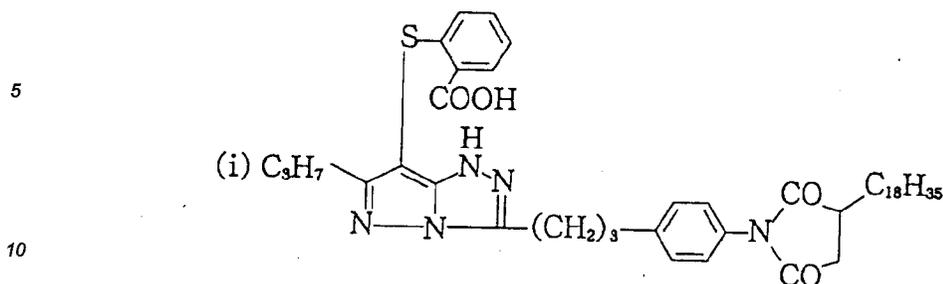


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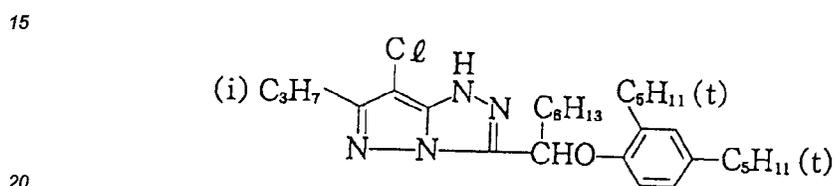
M - II - 6



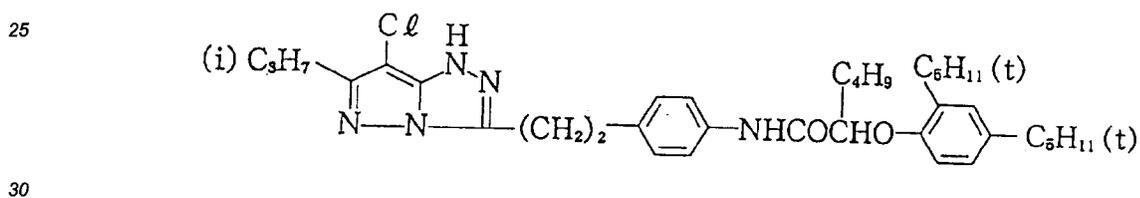
M - II - 7



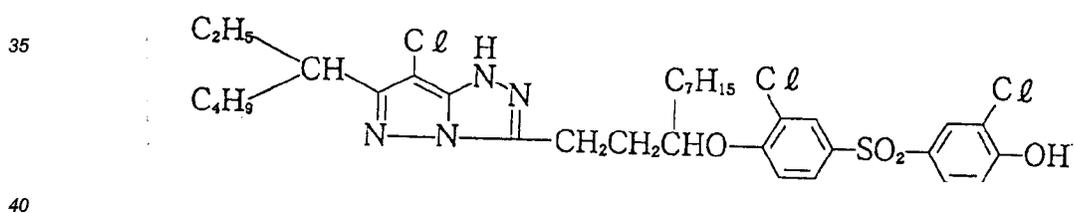
M - II - 8



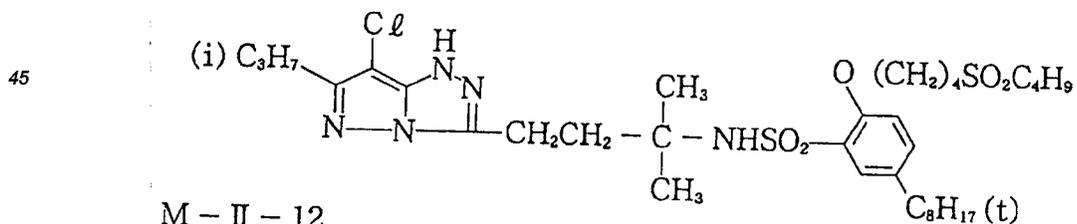
M - II - 9



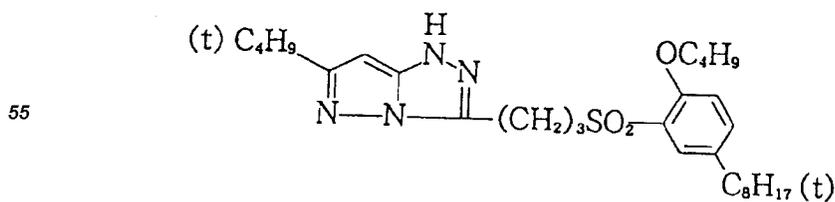
M - II - 10



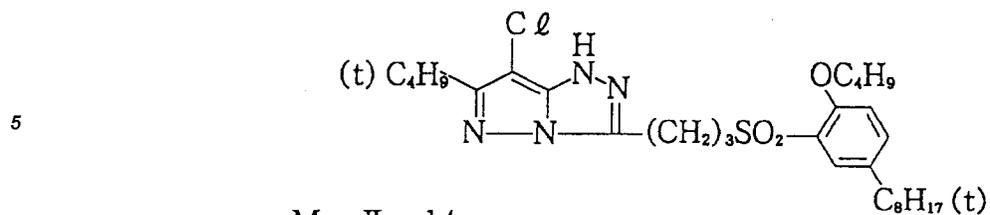
M - II - 11



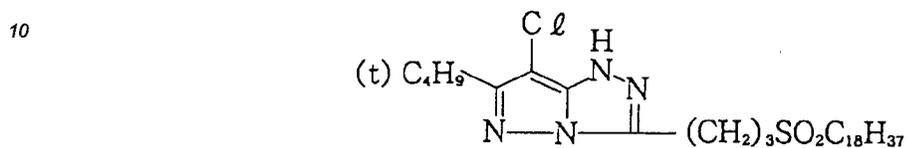
M - II - 12



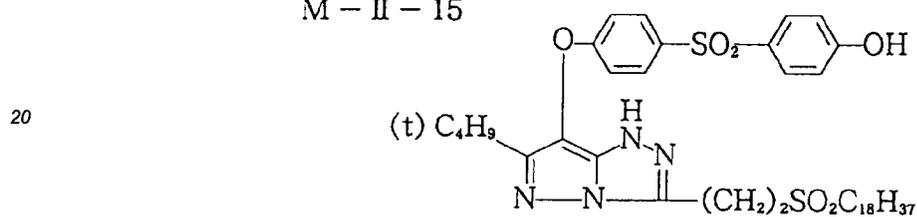
M - II - 13



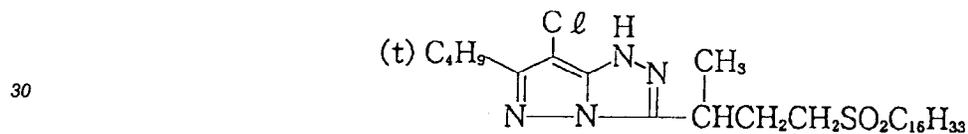
M - II - 14



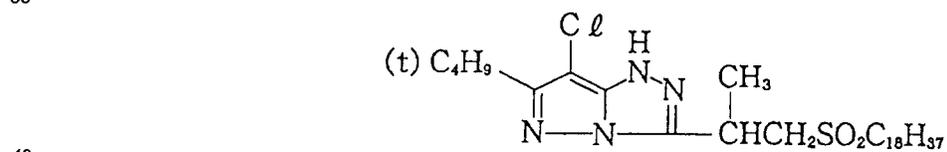
M - II - 15



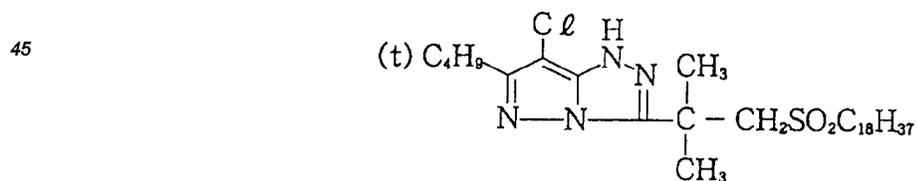
M - II - 16



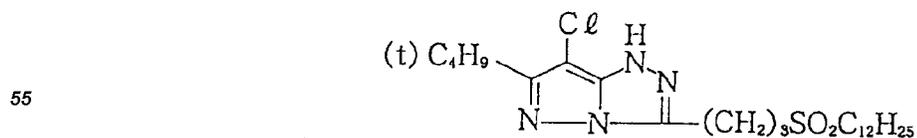
M - II - 17



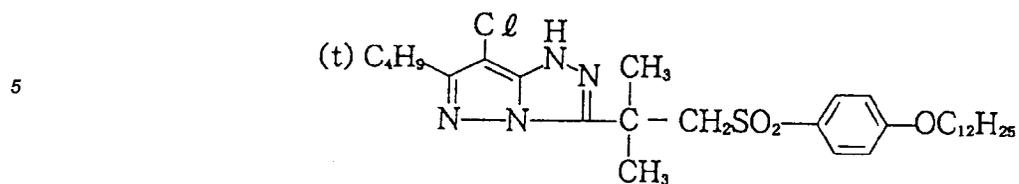
M - II - 18



M - II - 19

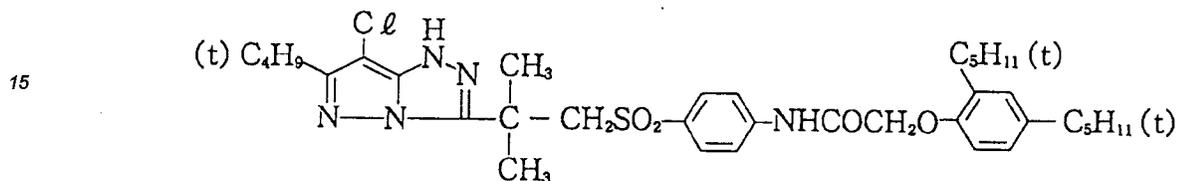


M - II - 20



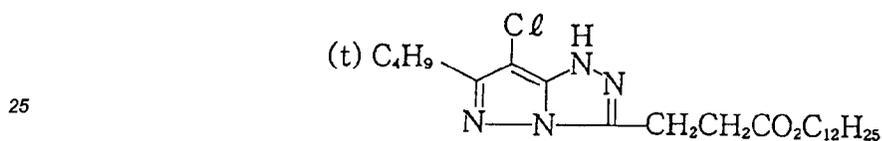
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M - II - 21



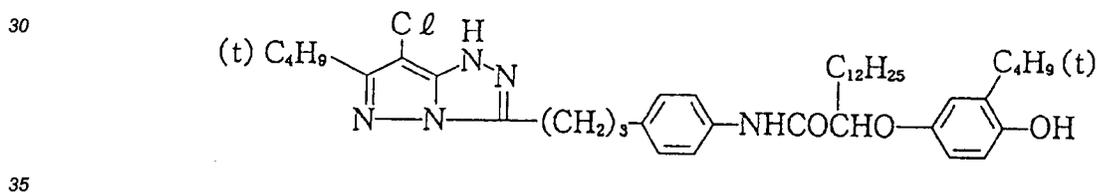
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M - II - 22



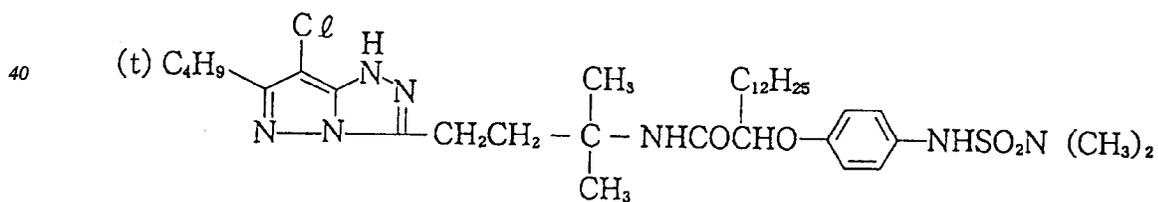
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M - II - 23



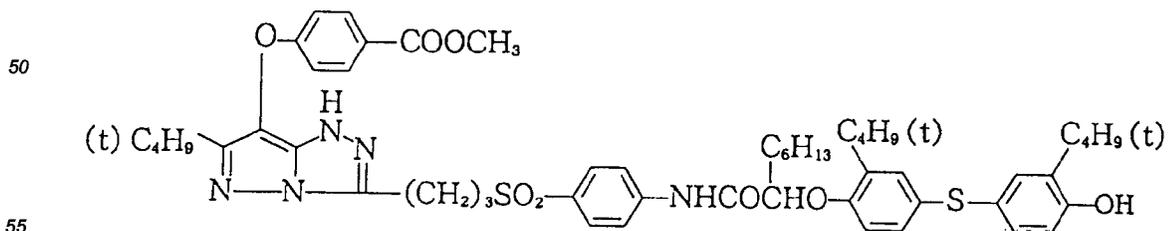
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M - II - 24

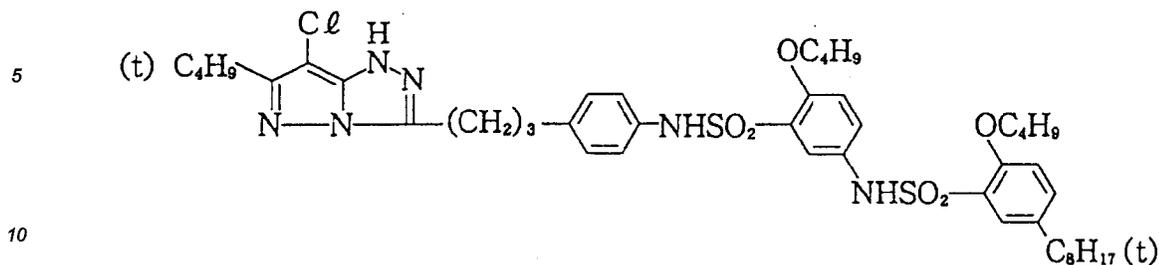


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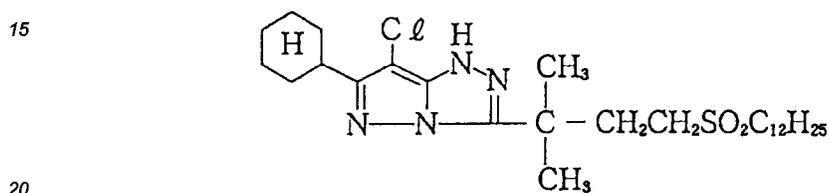
M - II - 25



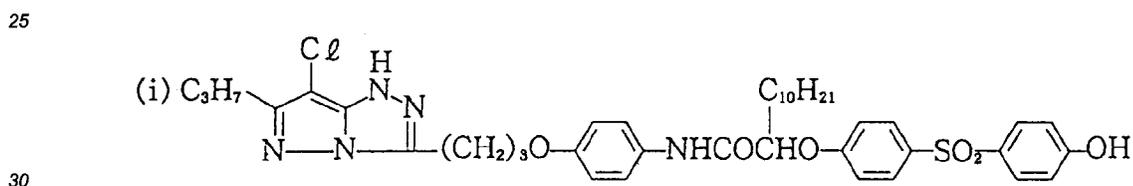
M - II - 26



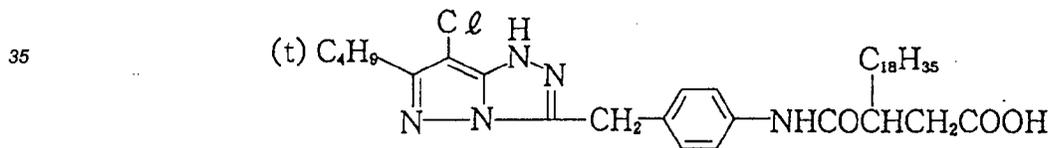
M - II - 27



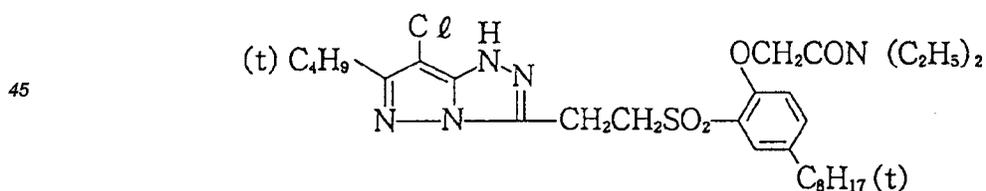
M - II - 28



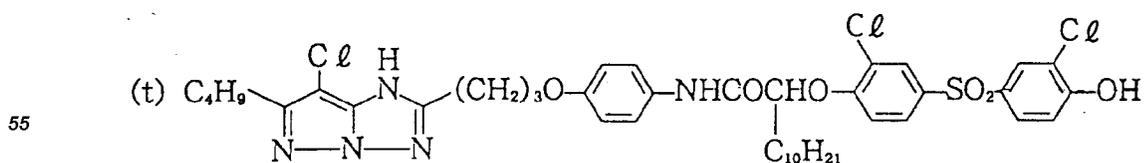
M - II - 29



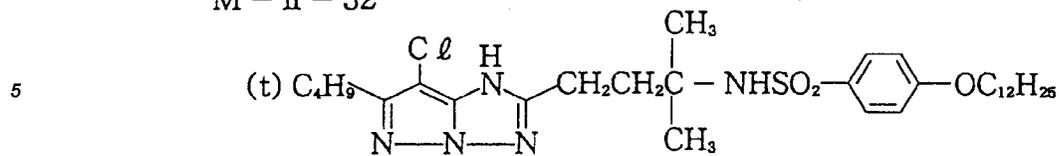
M - II - 30



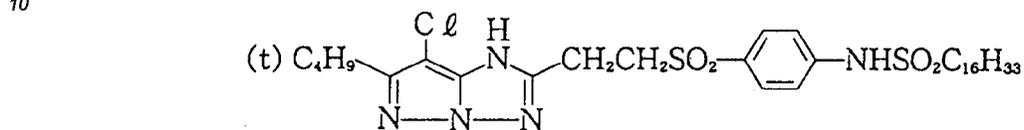
M - II - 31



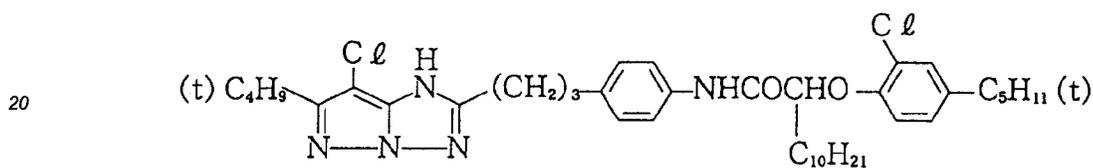
M - II - 32



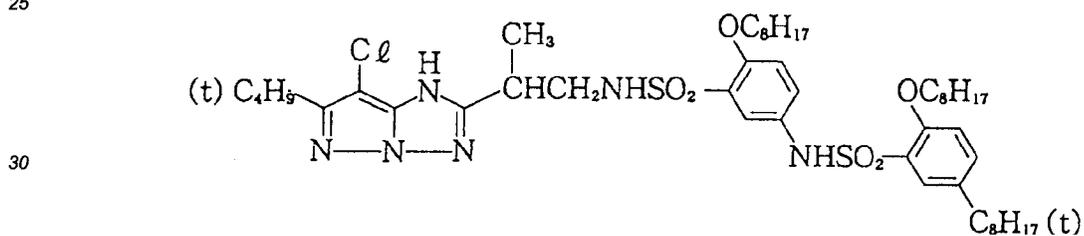
M - II - 33



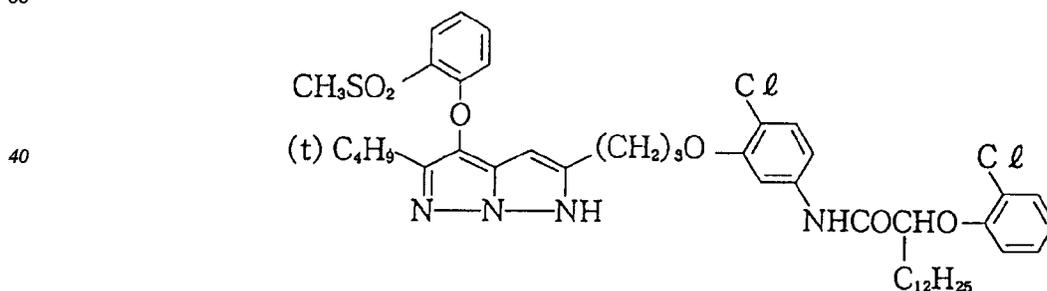
M - II - 34



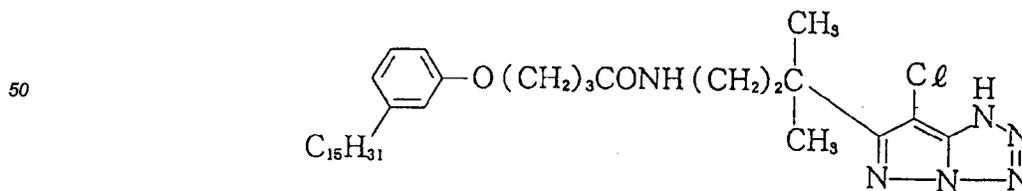
M - II - 35



M - II - 36

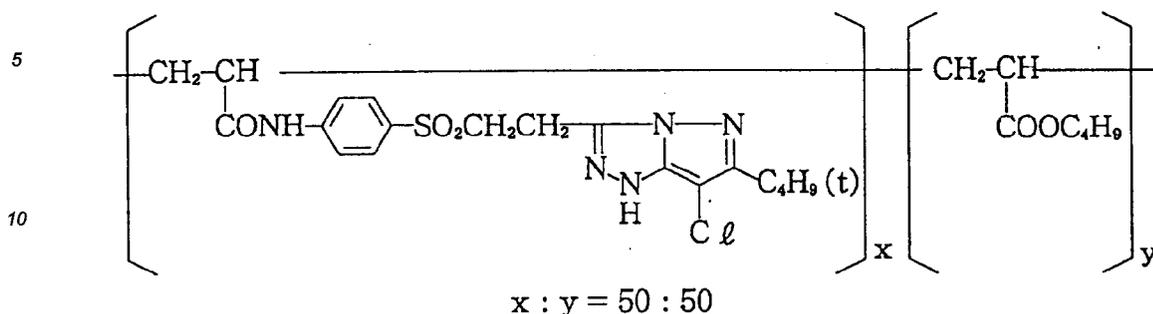


M - II - 37

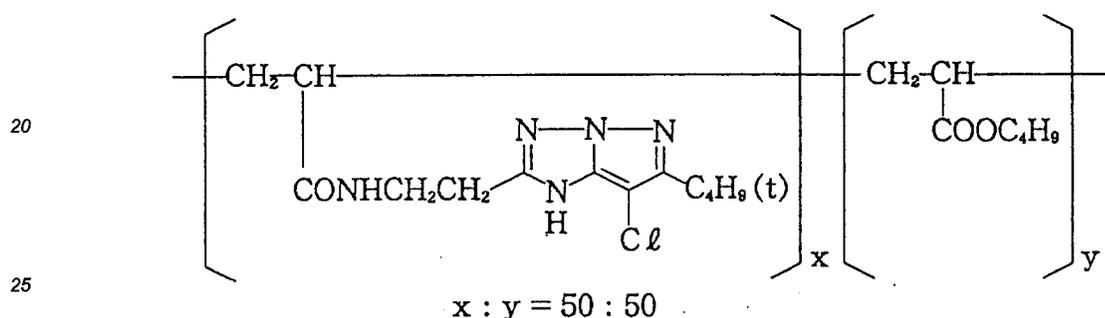


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M - II - 38



M - II - 39



The magenta coupler represented by formula M-I (hereinafter referred to as "coupler M-I") and the magenta coupler represented by formula M-II (hereinafter referred to as "coupler M-II") can be prepared readily by referring to Journal of Chemical Society, Perkin, I (1977), pp. 2047-2052, U.S. Patent No. 3,725,067, Japanese Patent Publication Open to Public Inspection (hereinafter referred to as "Japanese Patent O.P.I. Publication") No. 99437/1984, 42045/1983, 162548/1984, 171956/1984, 33552/1985, 43659/1985, 172982/1985, 190779/1985, 209457/1987 and 307453/1988.

Coupler M-I is employed in an amount of 1×10^{-3} to 1 mol, preferably 1×10^{-2} mol to 8×10^{-1} mol, per mol of silver halide.

Coupler M-II is employed in an amount of 1×10^{-3} to 1 mol, preferably 1×10^{-2} mol to 8×10^{-1} mol, per mol of silver halide.

In the present invention, coupler M-I and coupler M-II are employed in combination. The molar ratio of these couplers is preferably 10:1 to 1:5, still preferably 5:1 to 1:3. Other magenta couplers may also be employed together with these couplers.

In the invention, couplers M-I and M-II are contained in at least one of the green-sensitive silver halide emulsion layers.

Couplers M-I and M-II are incorporated in a silver halide emulsion layer by a process comprising dissolving the couplers, either separately or together, in a mixture of a high-boiling solvent (e.g. dibutyl phthalate, tricresyl phosphate) and a low-boiling solvent (e.g. butyl acetate, ethyl acetate); mixing the resulting solution with an aqueous gelatin solution containing a surfactant; emulsifying the solution by means of a high-speed rotary mixer, a colloid mill or an ultrasonic dispersion mixer; and adding the resulting dispersion directly to an emulsion. It is also possible to set the dispersion, cut it into small pieces, wash them with water, and add them to an emulsion.

As stated above, couplers M-I and M-II may be dissolved in a solvent either separately and together. In the invention, however, it is preferred that these couplers be dissolved in a solvent simultaneously.

The compound represented by formula I will be explained below.

The aliphatic group represented by R_{40} , R_{50} or R_{60} may be a C1-32 alkyl group, an alkenyl group, an alkynyl group, a cycloalkyl group or a cycloalkenyl group. The alkyl, alkenyl and alkynyl groups each may be either straight-chain or branched. These aliphatic groups may have a substituent.

The aromatic group represented by R_{40} , R_{50} or R_{60} may be an aryl group (e.g. phenyl) or an aromatic heterocyclic group (e.g. pyridyl, furyl). These aromatic groups may have a substituent.

It is preferred that R_{40} , R_{50} and R_{60} each be an alkyl group or an aryl group. They may be either identical

with or different from each other. The total number of carbon atoms contained in R₄₀, R₅₀ and R₆₀ is preferably 6 to 50.

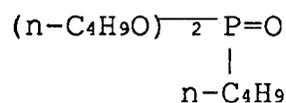
There is no restriction as to the type of a substituent for R₄₀, R₅₀ and R₆₀, but suitable substituents include an alkoxy group, an aryloxy group, an acyl group, an acyloxy group, an alkoxy carbonyl group, an aryloxy carbonyl group, a carbamoyl group, a sulfamoyl group, an acylamino group and an amino group.

The characters, 1, m and n each represent 0 or 1, but at least one of them is 0, which means that at least one of R₄₀, R₅₀ and R₆₀ is directly linked to the phosphor atom. It is preferred that all of 1, m and n be 0.

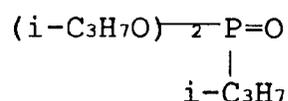
Representative examples of the compound represented by formula I will be given below.

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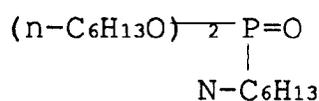


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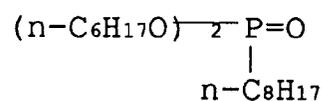


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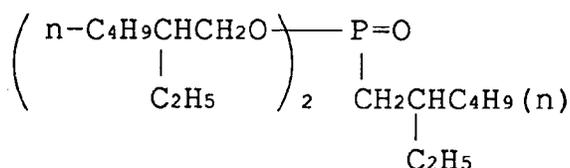


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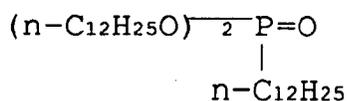
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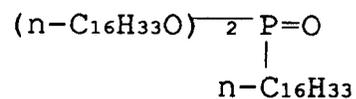
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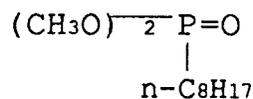


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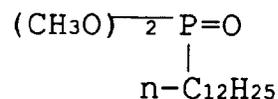


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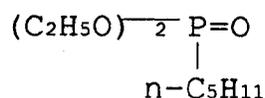
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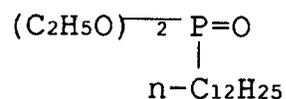
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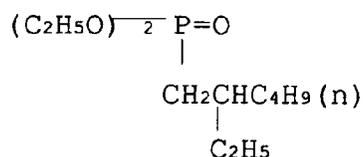


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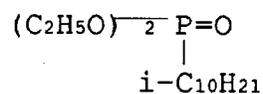


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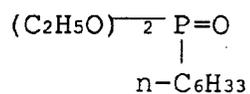


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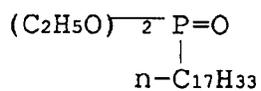
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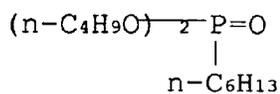


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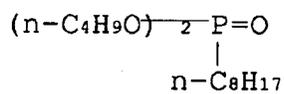


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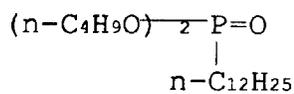


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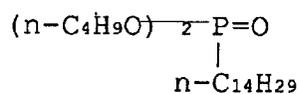


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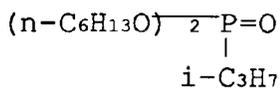
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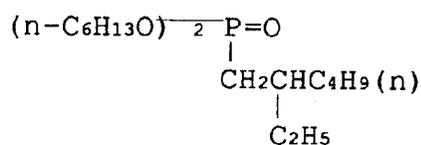
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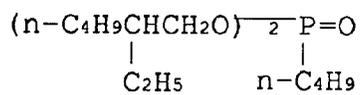
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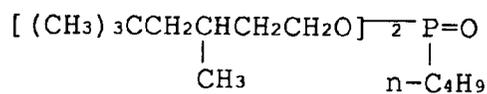
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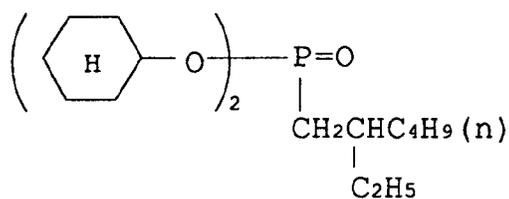


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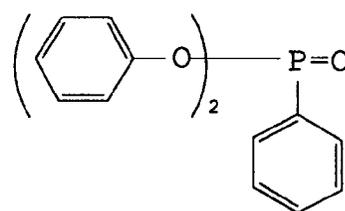


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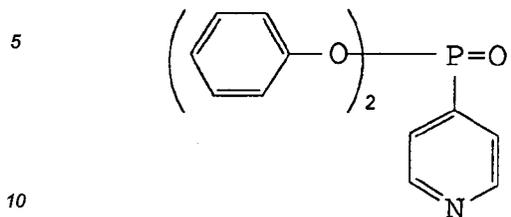


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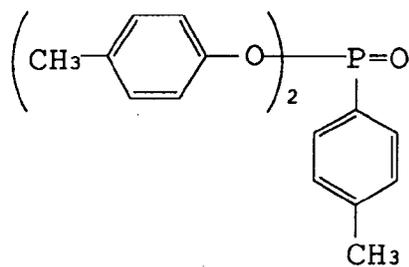
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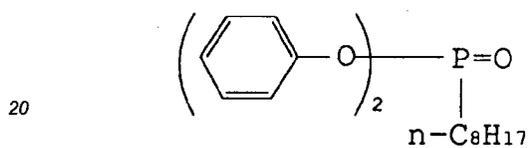
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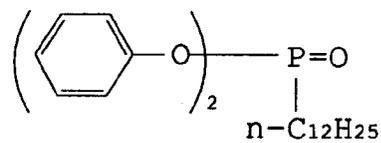
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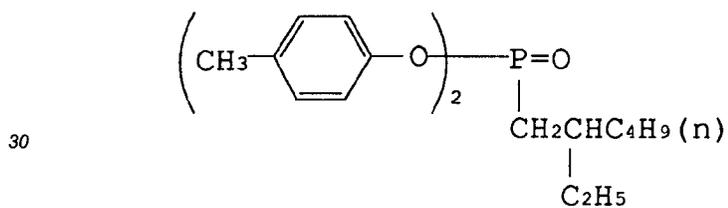
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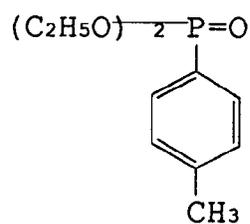
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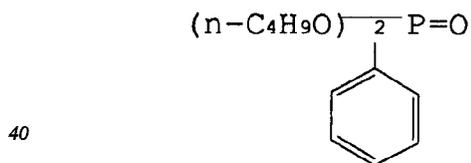
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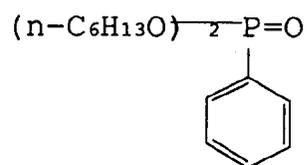
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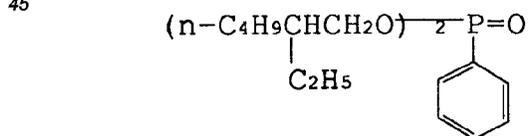
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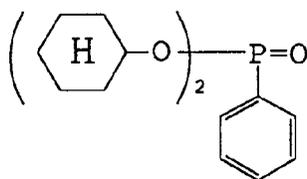
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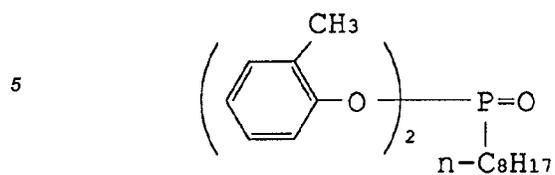


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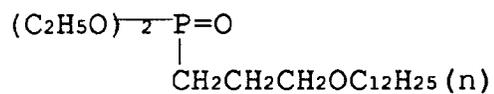


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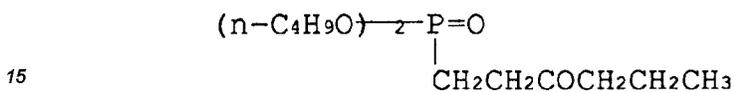


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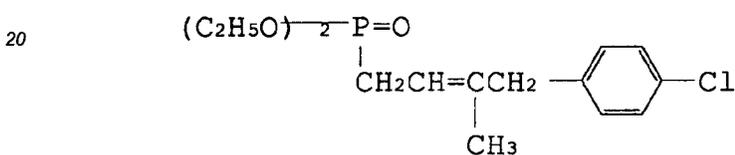


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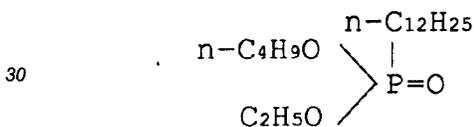
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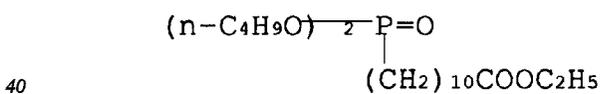


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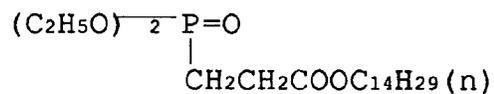


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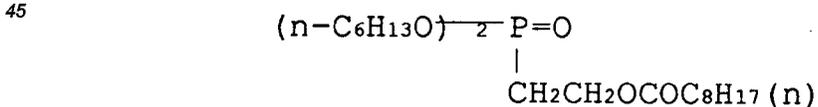
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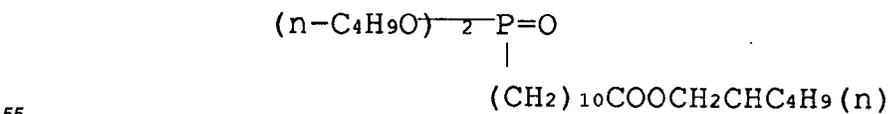
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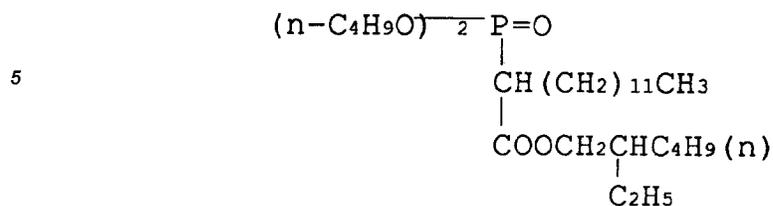
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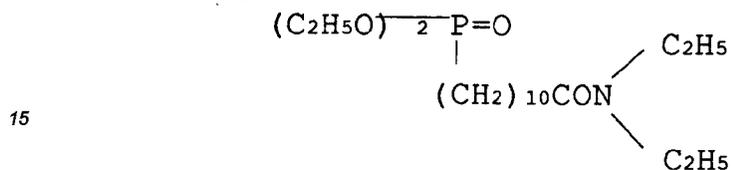
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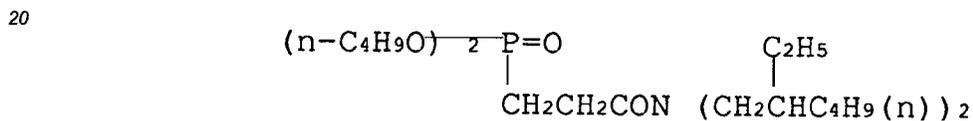
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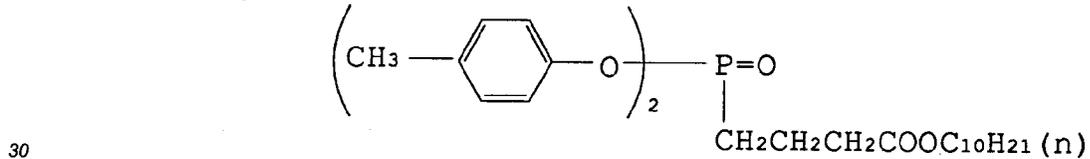
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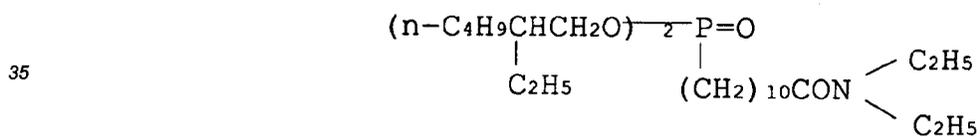
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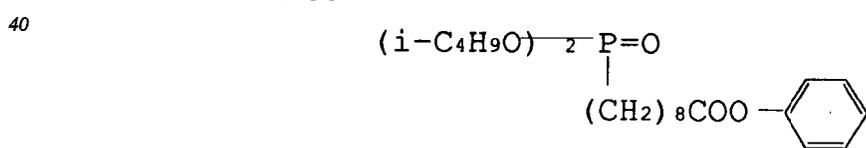
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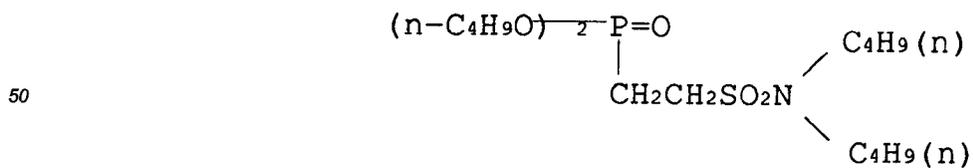
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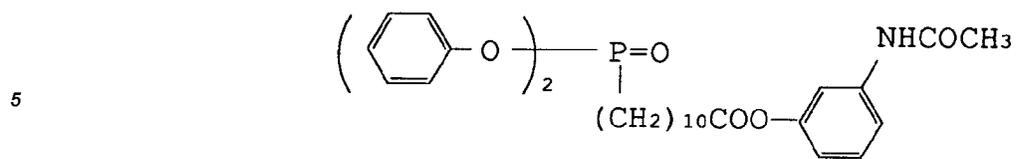
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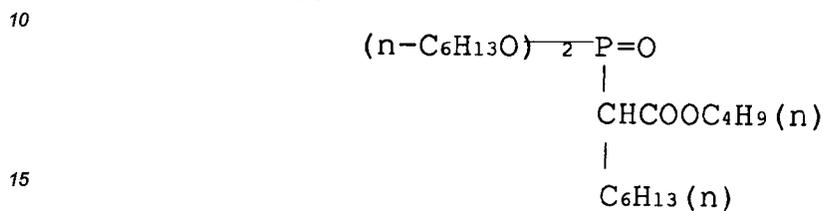
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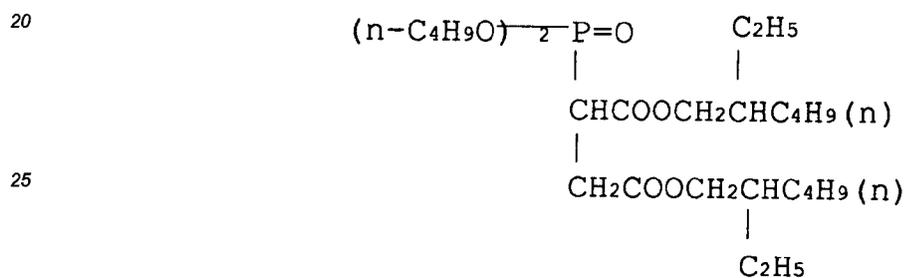
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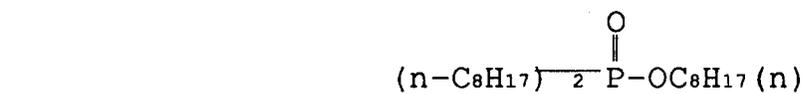
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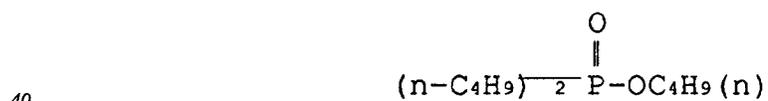
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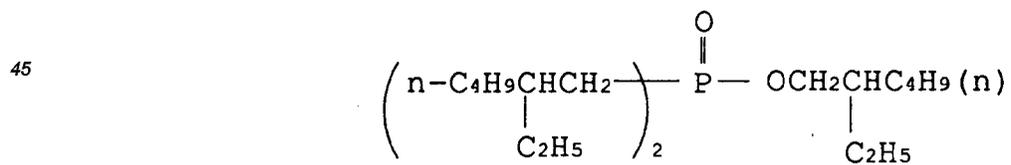
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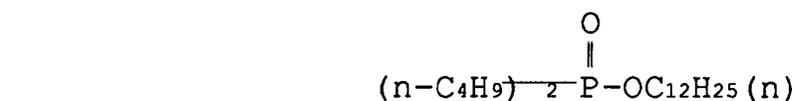
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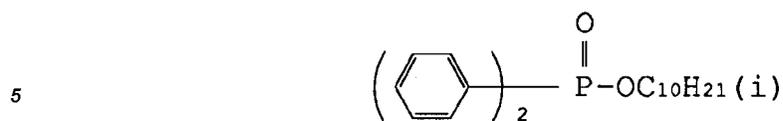
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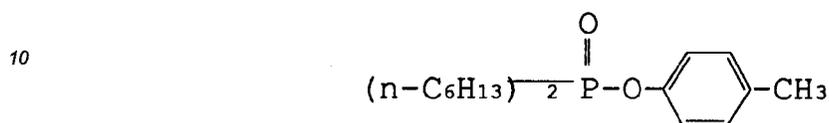
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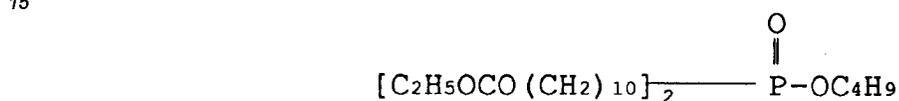
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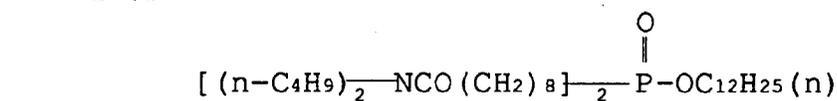
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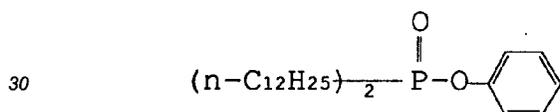
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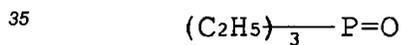
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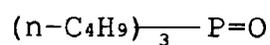
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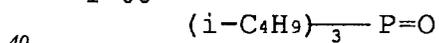
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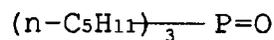
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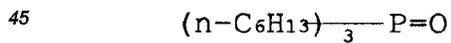
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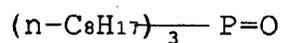
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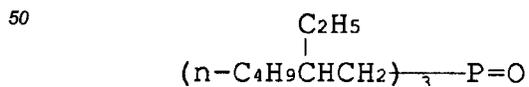
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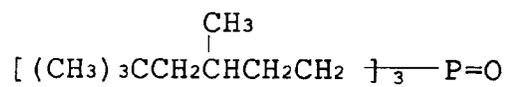
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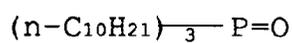
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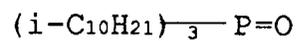
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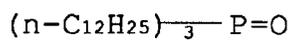
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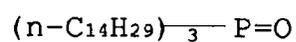


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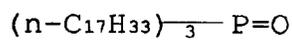


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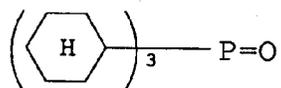


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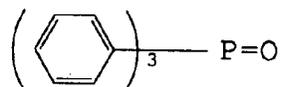
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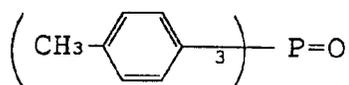


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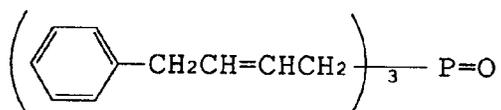
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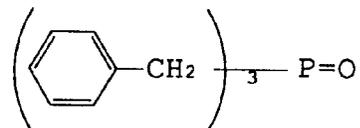
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I-81



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I-82



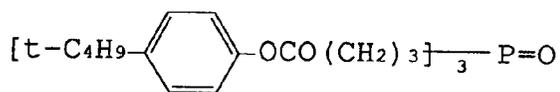
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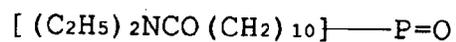
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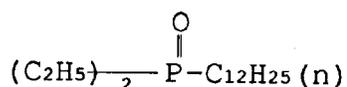


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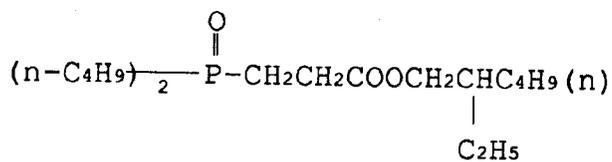


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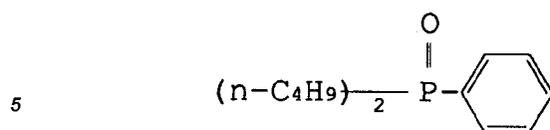
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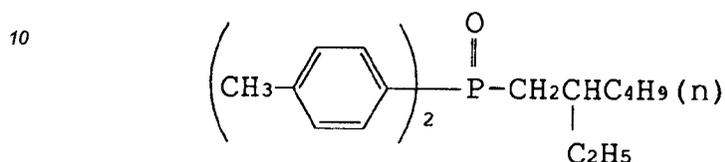


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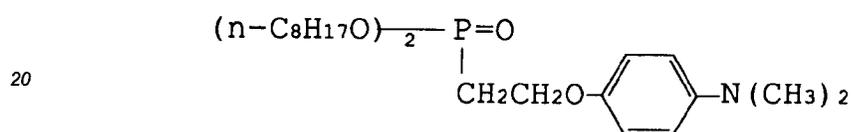
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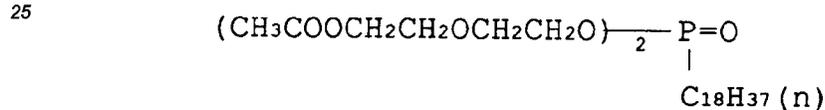
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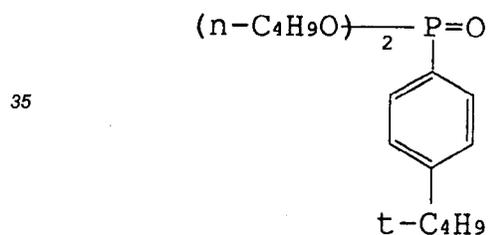
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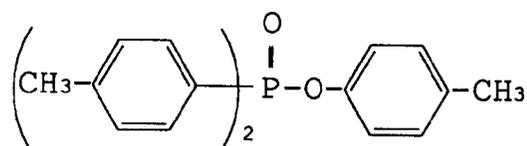
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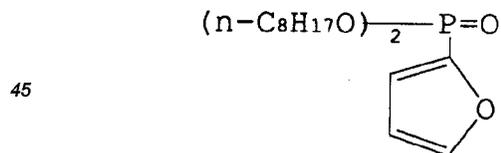
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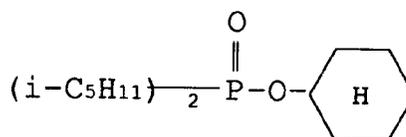
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I-94



I-95



50 Compounds described in Japanese Patent O.P.I. Publication No. 19049/1981, pp. 4 to 5, are also included in the compounds represented by formula I.

Some of the compounds represented by formula I are commercially available, and they are prepared readily by referring to Japanese Patent O.P.I. Publication No. 19049/1981, British Patent No. 694,772, Journal of the American Chemical Society, 79, p. 6524 (1957), Journal of Organic Chemistry, 25, p. 1,000 (1960), and Organic Synthesis, 31, p. 33 (1951).

55 An explanation will be made on the compounds represented by formula II.

The alkyl group represented by R_A or R_B may be one with 1 to 32 carbon atoms. The alkenyl group and the alkynyl groups represented by R_A or R_B each may be one with 2 to 32 carbon atoms. The cycloalkyl group and cycloalkenyl group represented by R_A or R_B each may be one with 3 to 12 carbon atoms. The alkyl group,

the alkenyl group and the alkynyl group each may be straight-chain or branched, and may have a substituent.

The aryl group represented by R_A or R_B may preferably be phenyl, which may have a substituent.

The heterocyclic group represented by R_A or R_B may preferably be a 5- to 7-membered ring, which may be a condensed ring with a substituent.

5 The alkoxy group represented by R_A or R_B may be 2-ethoxyethoxy, pentadecyloxy, 2-dodecyloxyethoxy or phenethyloxyethoxy, which each may have a substituent.

Phenyloxy is preferable as the aryloxy group represented by R_A or R_B . The aryl nuclei of the aryloxy group may be substituted. Examples include phenoxy, p-t-butylphenoxy and m-pentadecylphenoxy.

10 The heterocyclic oxy group represented by R_A or R_B may preferably be one with a 5- to 7-membered heterocyclic ring, which may have a substituent such as 3,4,5,6-tetrahydropyranyl-2-oxy or 1-phenyltetrazole-5-oxy.

Of the non-color-forming compounds of the invention, especially preferred is one which is represented by the following formula III:



15 wherein R_E and R_F each represent a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

In the above formula, at least one of R_E and R_F should preferably be aryl. Most preferably, both of them are aryl, in particular, phenyl. If R_E is phenyl, it is especially preferred that the σ value of the hammett of the substituent at the para position of a sulfonamide group be -0.4 or more.

20 The alkyl group and the aryl group represented by R_E or R_F are the same as the alkyl group and the aryl group represented by R_A or R_B .

A polymer larger than a dimer may be formed in R_A or R_B .

R_A or R_B may combine with each other to form a 5- or 6-membered ring.

25 The non-color-forming compound of the invention should preferably have 8 or more, preferably 12 or more, carbon atoms.

Representative examples of the non-color-forming compound of formula II the invention will be given below.

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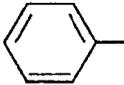
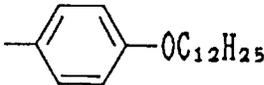
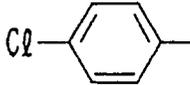
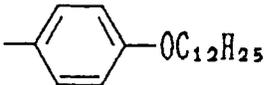
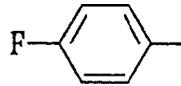
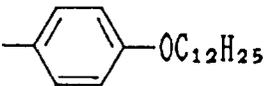
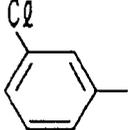
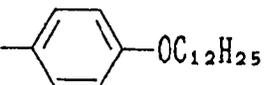
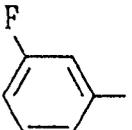
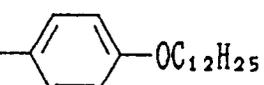
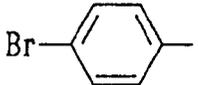
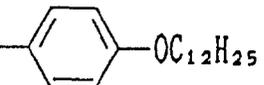
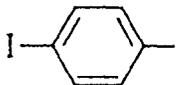
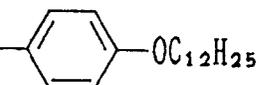
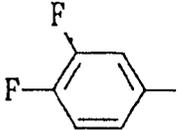
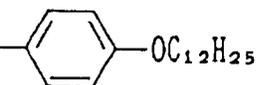
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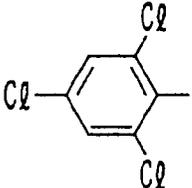
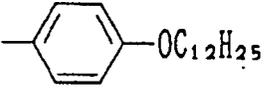
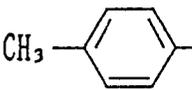
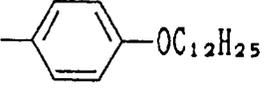
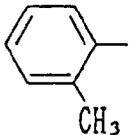
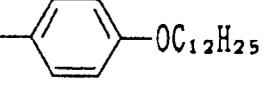
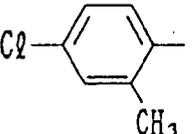
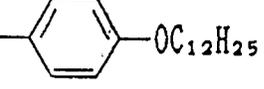
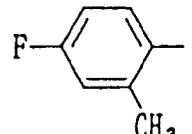
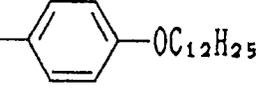
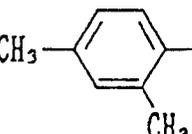
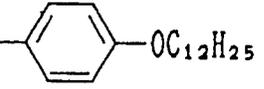
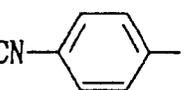
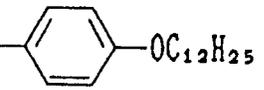
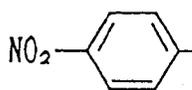
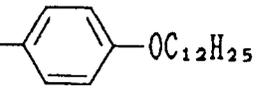
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Compound No.	R_A	R_B
II - 1		
II - 2		
II - 3		
II - 4		
II - 5		
II - 6		
II - 7		
II - 8		

Compound No.	R_A	R_B
II - 9		
II - 10		
II - 11		
II - 12		
II - 13		
II - 14		
II - 15		
II - 16		

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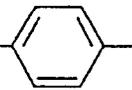
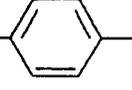
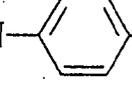
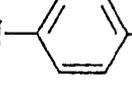
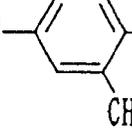
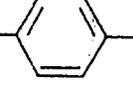
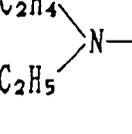
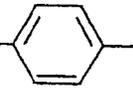
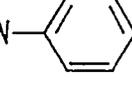
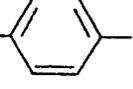
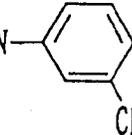
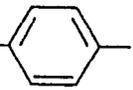
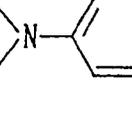
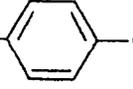
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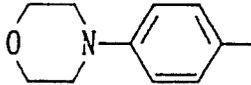
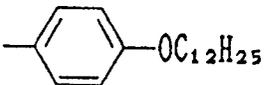
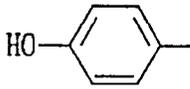
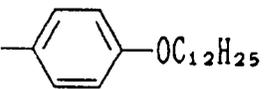
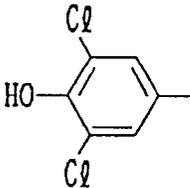
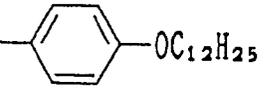
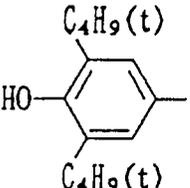
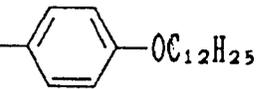
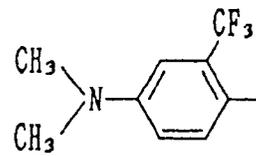
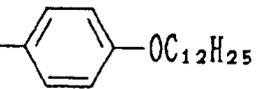
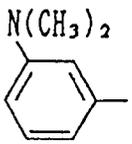
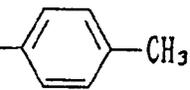
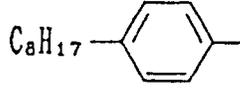
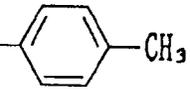
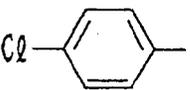
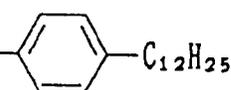
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Compound No.	R_A	R_B
II - 17	CH_3SO_2 - 	 - $\text{OC}_{12}\text{H}_{25}$
II - 18	CH_3OCO - 	 - $\text{OC}_{12}\text{H}_{25}$
II - 19	$(\text{CH}_3)_2\text{N}$ - 	 - $\text{OC}_{12}\text{H}_{25}$
II - 20	$(\text{C}_2\text{H}_5)_2\text{N}$ - 	 - $\text{OC}_{12}\text{H}_{25}$
II - 21	$(\text{C}_2\text{H}_5)_2\text{N}$ -  - CH_3	 - $\text{OC}_{12}\text{H}_{25}$
II - 22	$\text{CH}_3\text{SO}_2\text{NHC}_2\text{H}_4$ C_2H_5 -N-  - CH_3	 - $\text{OC}_{12}\text{H}_{25}$
II - 23	HOC_2H_4 C_2H_5 -N- 	 - $\text{OC}_{12}\text{H}_{25}$
II - 24	HOC_2H_4 C_2H_5 -N-  - CH_3	 - $\text{OC}_{12}\text{H}_{25}$
II - 25	$\text{CH}_3\text{OC}_2\text{H}_4$ C_2H_5 -N-  - CH_3	 - $\text{OC}_{12}\text{H}_{25}$

Compound No.	R_A	R_B
II - 26		
II - 27		
II - 28		
II - 29		
II - 30		
II - 31		
II - 32		
II - 33		

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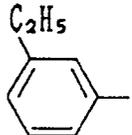
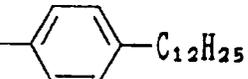
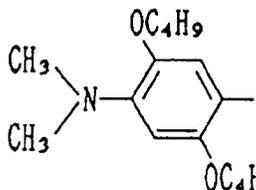
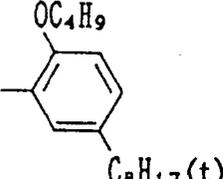
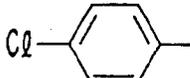
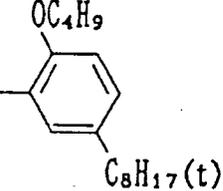
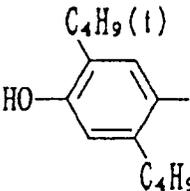
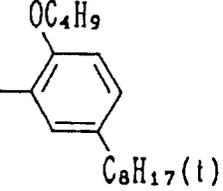
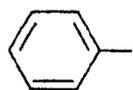
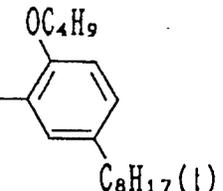
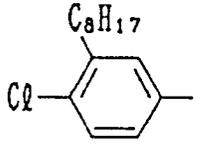
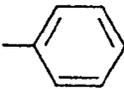
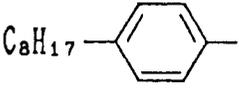
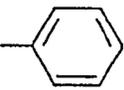
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Compound No.	R_A	R_B
II - 34		
II - 35		
II - 36		
II - 37		
II - 38		
II - 39		
II - 40		

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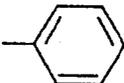
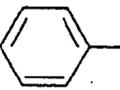
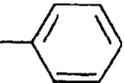
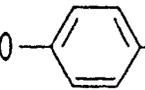
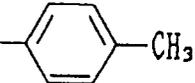
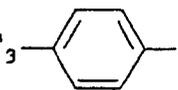
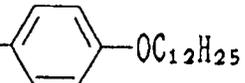
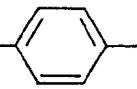
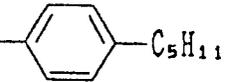
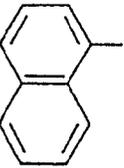
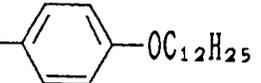
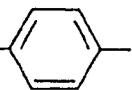
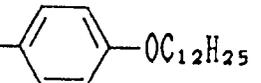
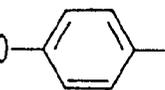
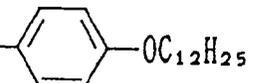
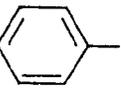
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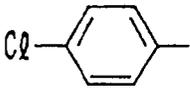
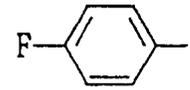
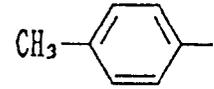
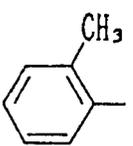
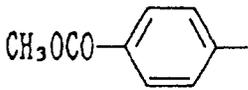
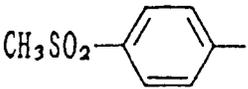
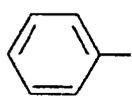
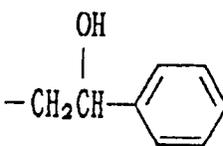
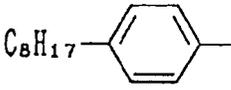
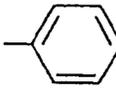
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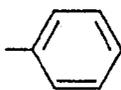
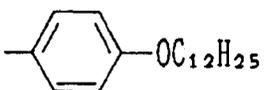
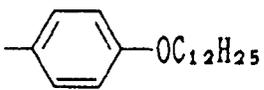
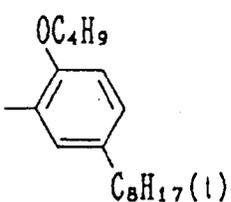
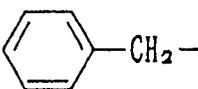
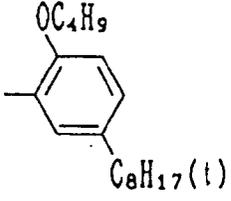
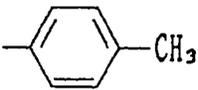
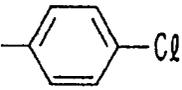
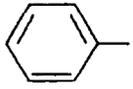
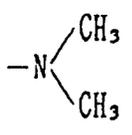
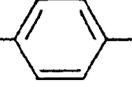
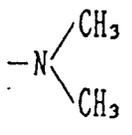
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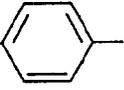
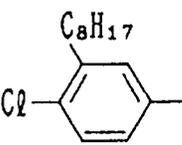
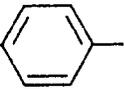
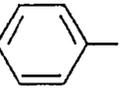
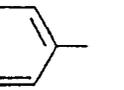
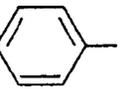
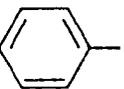
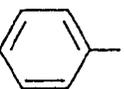
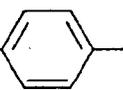
Compound No.	R_A	R_B
II-41	$C_{12}H_{25}O$ - 	
II-42	$C_{12}H_{25}OCOCHO$ -  C_2H_5	
II-43	$C_2H_5OCOCHO$ -  $C_3H_7(i)$	
II-44	CF_3 - 	
II-45	C_5H_{11} - 	
II-46		
II-47	CH_3CO - 	
II-48	CH_3O - 	
II-49		- $C_{16}H_{33}$

Compound No.	R _A	R _B
5 II-50		-C ₁₆ H ₃₃
10 II-51		-C ₁₆ H ₃₃
15 II-52		-C ₁₆ H ₃₃
20 II-53		-C ₁₆ H ₃₃
25 II-54		-C ₁₆ H ₃₃
30 II-55		-C ₈ H ₁₇
35 II-56		
40 II-57		-C ₃ H ₇ (l)
45 II-58	C ₈ H ₁₇ -	
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Compound No.	R _A	R _B
5 II - 59	$\begin{array}{c} \text{C}_2\text{H}_5 \\ \\ \text{C}_4\text{H}_9\text{CHCH}_2- \end{array}$	
10 II - 60	CH ₃ -	
15 II - 61	Cl(CH ₂) ₂ -	
20 II - 62	CF ₃ CH ₂ -	
25 II - 63	 -CH ₂ -	
30 II - 64	C ₈ H ₁₇ -	
35 II - 65	C ₁₂ H ₂₅ -	
40 II - 66		
45 II - 67	C ₈ H ₁₇ - 	

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Compound No.	R_A	R_B
II - 68	$(t)C_4H_9$ - 	$-N \begin{cases} CH_3 \\ CH_3 \end{cases}$
II - 69	 C_8H_{17} Cl	$-N \begin{cases} CH_3 \\ CH_3 \end{cases}$
II - 70	$C_{12}H_{25}CO$ - 	$-N \begin{cases} CH_3 \\ CH_3 \end{cases}$
II - 71	$C_8H_{17}OCOCHO$ -  C_4H_9	$-N \begin{cases} CH_3 \\ CH_3 \end{cases}$
II - 72	$CH_3OCOCHO$ -  $C_{12}H_{25}$	$-N \begin{cases} CH_3 \\ CH_3 \end{cases}$
II - 73	$C_{12}H_{25}OCOCHO$ -  C_2H_5	$-N \begin{cases} CH_3 \\ CH_3 \end{cases}$
II - 74	$C_8H_{17}OCO$ - 	$-N \begin{cases} CH_3 \\ CH_3 \end{cases}$
II - 75	$C_{12}H_{25}O$ - 	$-N \begin{cases} C_2H_5 \\ C_2H_5 \end{cases}$
II - 76	C_8H_{17} - 	$-N \begin{cases} C_2H_5 \\ C_2H_5 \end{cases}$

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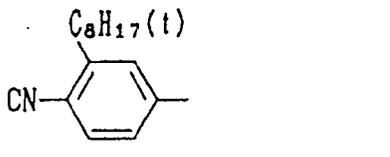
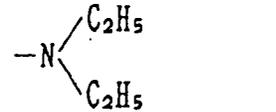
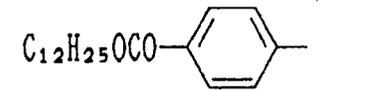
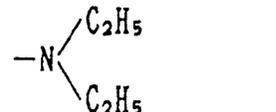
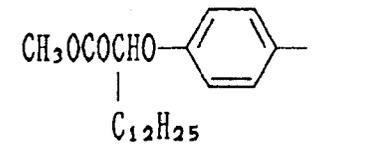
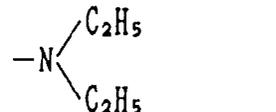
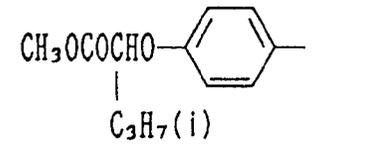
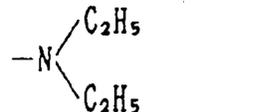
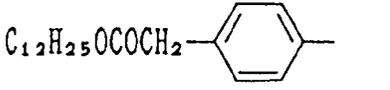
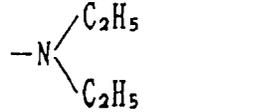
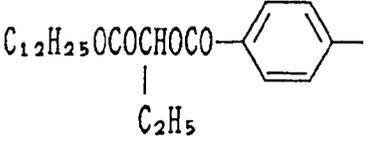
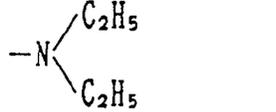
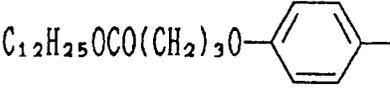
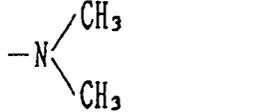
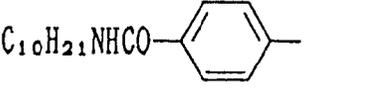
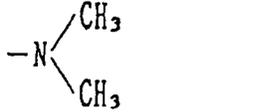
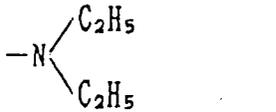
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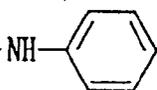
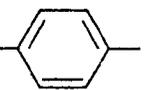
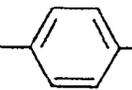
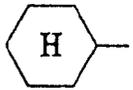
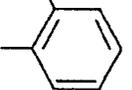
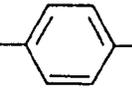
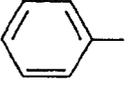
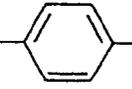
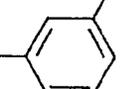
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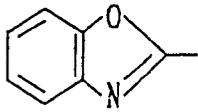
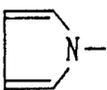
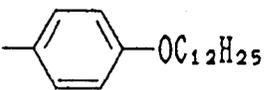
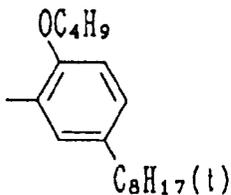
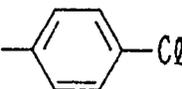
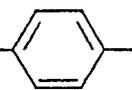
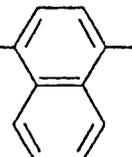
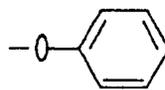
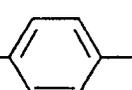
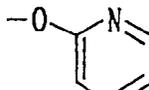
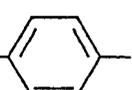
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Compound No.	R_A	R_B
II-77		
II-78		
II-79		
II-80		
II-81		
II-82		
II-83		
II-84		
II-85		

Compound No.	R _A	R _B
5 II - 86	C ₈ H ₁₇ - 	-NH- 
10 II - 87	C ₈ H ₁₇ -	-C(CH ₃) ₃
15 II - 88	CCl ₃ CH ₂ -	-C ₁₆ H ₃₃
20 II - 89	C ₅ H ₁₁ - 	-N $\begin{cases} \text{C}_3\text{H}_7 \\ \text{C}_3\text{H}_7 \end{cases}$
25 II - 90	H-	 -OC ₁₂ H ₂₅
30 II - 91		 -OC ₄ H ₉ (t)C ₈ H ₁₇
35 II - 92	CF ₃ CH=CH-	 -OC ₁₂ H ₂₅
40 II - 93		 -C ₈ H ₁₇ (t)
45 II - 94	HOCH ₂ CH ₂ C=C -	 -CONHC ₉ H ₁₉

Compound No.	R_A	R_B
II - 95		$-C_{18}H_{37}$
II - 96		
II - 97	C_4H_9CO-	
II - 98	$C_{10}H_{21}NHCO-$	
II - 99	C_8H_{17} 	$-OC_2H_5$
II - 100	C_4H_9 	
II - 101	C_8H_{17} 	
II - 102	$C_{12}H_{25}$ 	$-NH_2$

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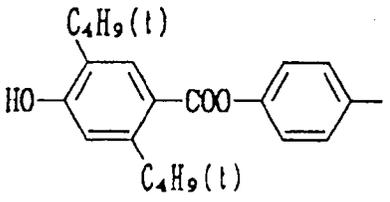
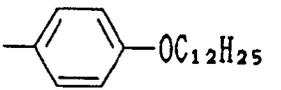
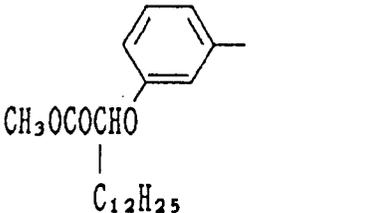
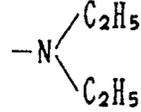
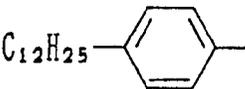
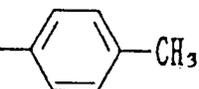
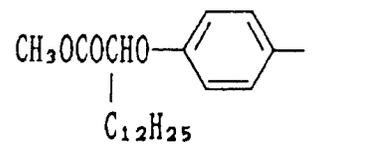
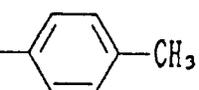
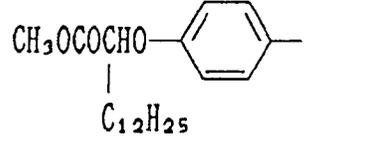
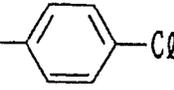
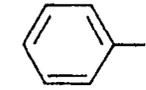
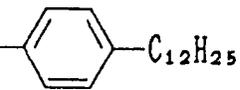
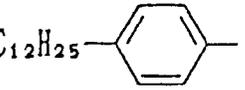
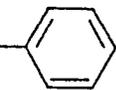
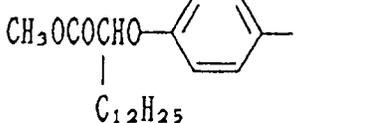
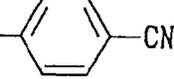
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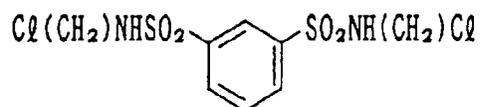
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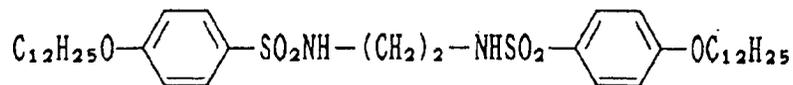
Compound No.	R_A	R_B
5 10 15 20 25 30 35 40 45 50 55 II-103		
II-104		
II-105		
II-106		
II-107		
II-108		
II-109		
II-110		

II-111



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II-112



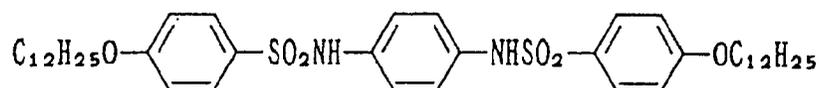
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II-113



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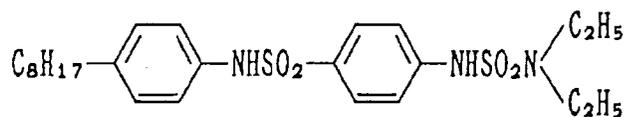
II-114



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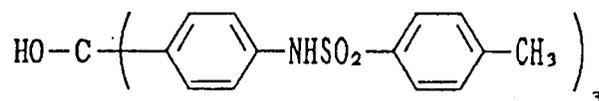
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II-115



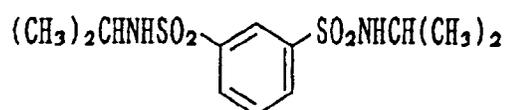
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II-116



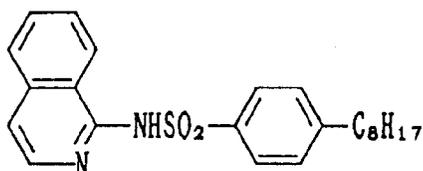
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II-117



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II-118

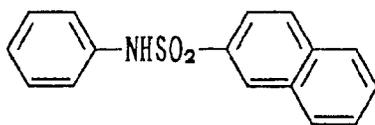


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II - 119

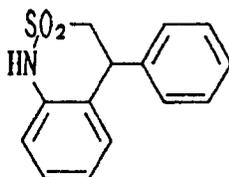
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II - 120

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The non-color-forming compound of the invention can be prepared by a known method, for example, by the method described in Japanese Patent Application No. 20589/1986.

The amount of the non-color-forming compound represented by formula II is preferably 5 to 500 mol%, still preferably 10 to 300 mol%, based on the combined amount of the couplers.

Some of the non-color-forming compounds represented by formula II are described in Japanese Patent O.P.I. Publication Nos. 76543/1982, 179842/1983, 1139/1983 and 178258/1987.

25

An explanation will be made on the compound represented by formula A-I.

Examples of the divalent organic group represented by J' include an alkylene group, an alkenylene group, a cycloalkylene group, an arylene group, a heterocyclic group and -J''-NH- (where J'' represents an arylene group), which each may have a substituent.

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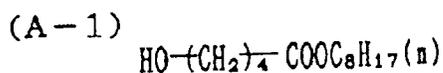
The alkyl, cycloalkyl, aryl, alkenyl, alkynyl and cycloalkenyl groups represented by Y each may preferably be one with 1 to 32 carbon atoms. The alkyl, alkenyl and alkynyl groups may be either straight-chain or branched, and each may have a substituent.

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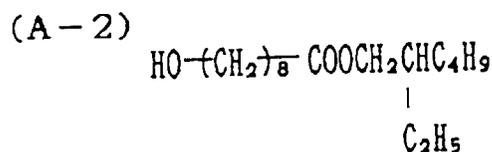
The heterocyclic group represented by Y may preferably be a nitrogen-containing heterocyclic group, such as a pyrrolyl group, a pyrazolyl group, an imidazolyl group, a pyridyl group, a pyrrolinyl group, an imidazolidinyl group, an imidazoliny group, a piperadiny group or a piperidinyl group. These heterocyclic groups each may have a substituent.

Representative examples of the compound represented by formula A-I are given below.

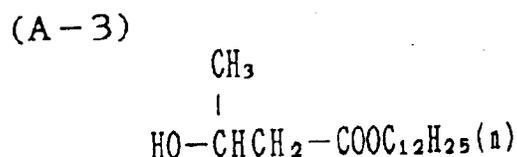
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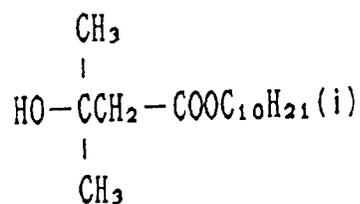
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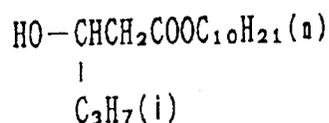
(A-4)

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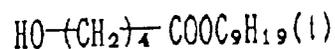
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(A-5)



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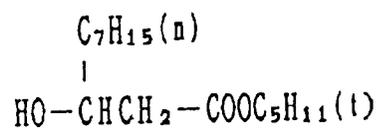
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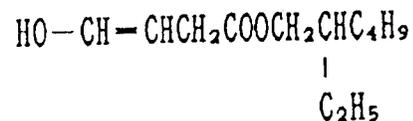
(A-7)

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(A-8)

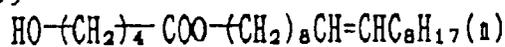


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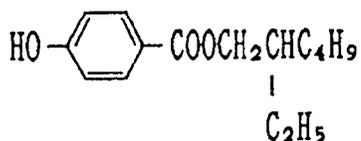
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(A-10)



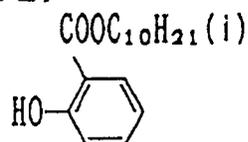
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(A-11)

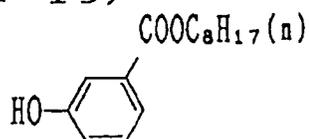


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(A-12)

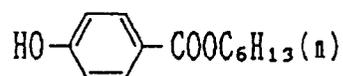


(A-13)

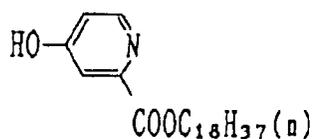


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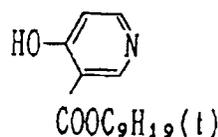
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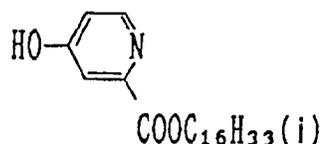
(A-28)



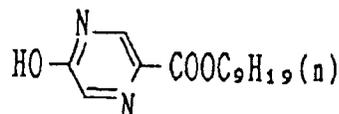
(A-29)



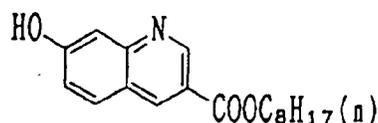
(A-30)



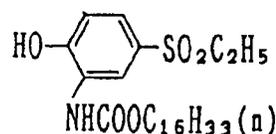
(A-31)



(A-32)



(A-33)



An explanation will be made on the compound represented by formula A-II (hereinafter referred to as "compound II").

The alkyl group, the cycloalkyl group, the alkenyl group and the aryl group represented by Ra or Rb may respectively be the same as the alkyl group, the cycloalkyl group, the alkenyl group and the aryl group represented by any one of R₁₁ to R₁₇ in formulae M-Ia to M-Ig. The alkyl group, the alkenyl group, the alkoxy group, the aryl group, the aryloxy group, the alkylthio group, the arylthio group, the acyl group, the acylamino group, the sulfonyl group and the sulfonamide group represented by R_c or R_d may respectively be the same as the alkyl group, the alkenyl group, the alkoxy group, the aryl group, the aryloxy group, the alkylthio group, the arylthio group, the acyl group, the acylamino group, the sulfonyl group and the sulfonamide group represented by any one of R₁₁ to R₁₇ in formulae M-I, M-Ia to M-Ig.

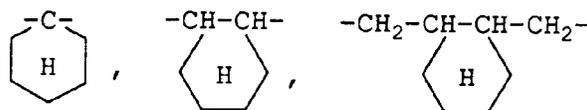
The groups represented by R_a, R_b, R_c or R_d each may have a substituent, and suitable substituents include a halogen atom, an alkyl group, an alkenyl group, an alkoxy group, an aryloxy group, a hydroxy group, an alkoxy carbonyl group, an aryloxy carbonyl group, an alkylamino group, an arylamino group, an acylamino group, a carbamoyl group, a sulfonamide group and a sulfamoyl group.

J represents a divalent bonding group, and examples include an alkylene group, -SO₂-, -S-, -CON(R₁₈)-, -SO₂N(R₁₈)-, -N(R₁₈)SO₂-, N(R₁₈)CO- and -N(R₁₈)-. Of them, preferred are -SO₂-, -S-, -SO₂N(R₁₈)- and -N(R₁₈)SO₂-.

R₁₈ represents a hydrogen atom or a substituted or unsubstituted alkyl group or a phenyl group.

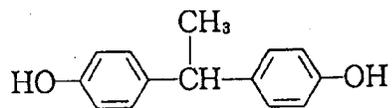
The alkylene group represented by J may have one or a plurality of substituents, and suitable substituents include an aryl group, a cyan group, a halogen atom, a heterocyclic group, a cycloalkyl group, an alkoxy group, a hydroxy group and an aryloxy group.

The alkylene group may be one in which the alkylene chain itself constitutes a cycloalkyl ring, as in the case of



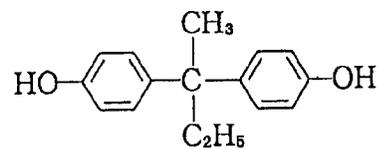
Representative examples of compound A-II will be given below.

A-201



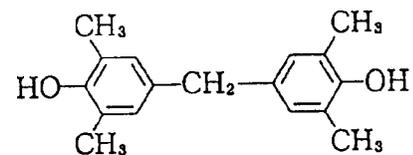
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A-202



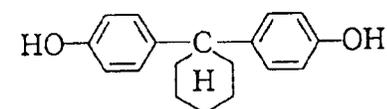
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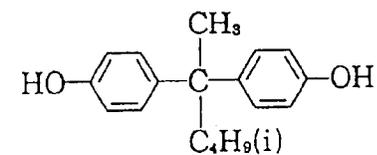
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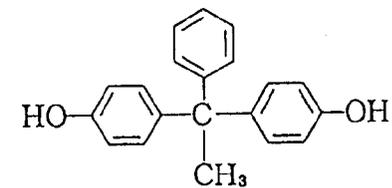
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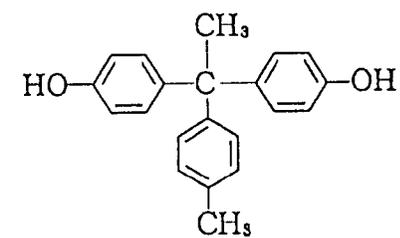
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A-206



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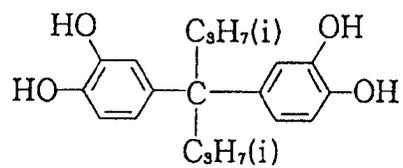
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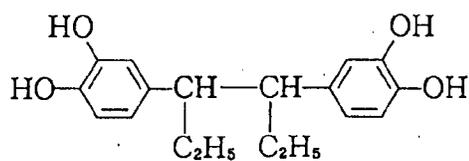


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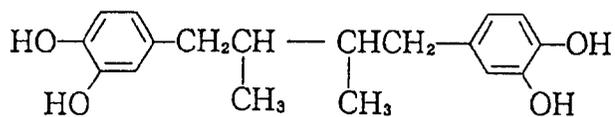
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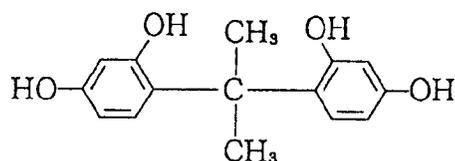
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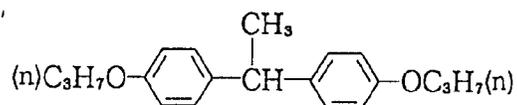
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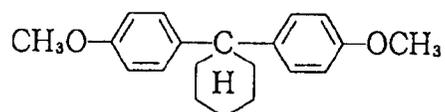
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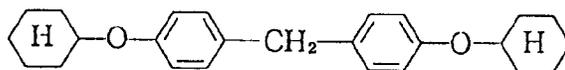
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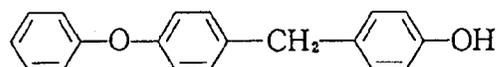
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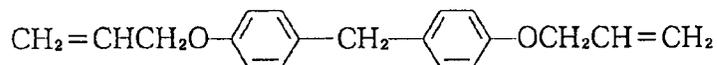
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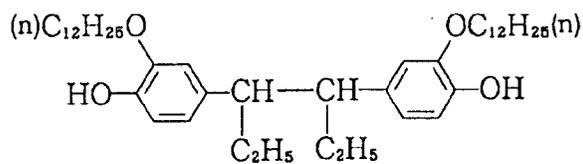
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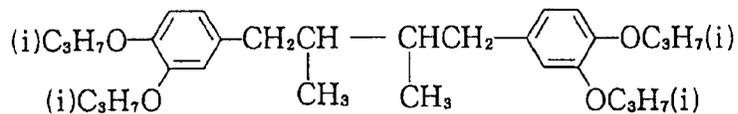
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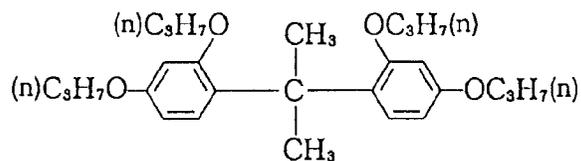
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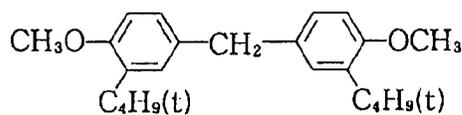
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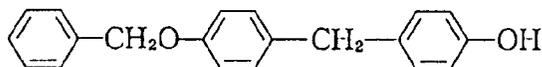
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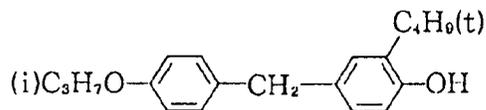
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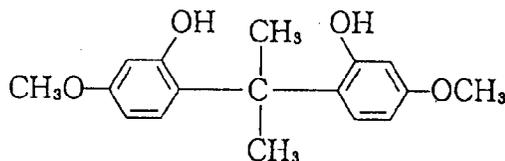
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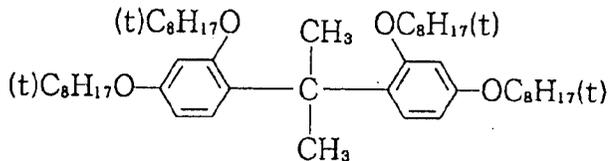
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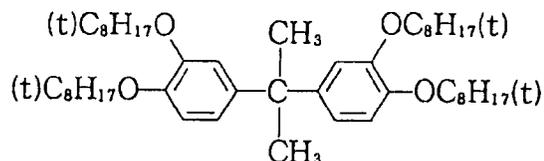
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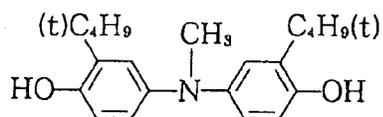
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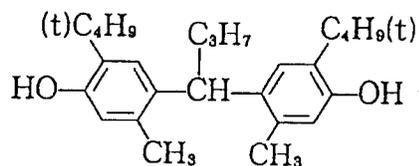
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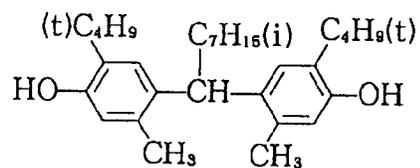
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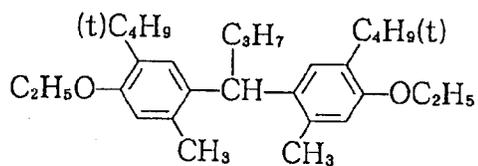
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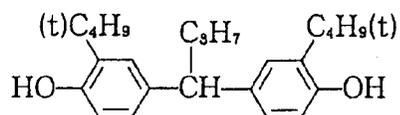
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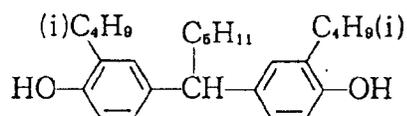
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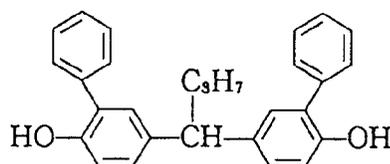
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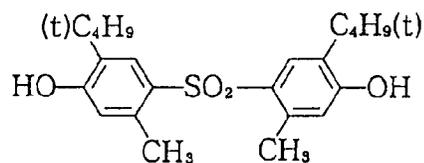
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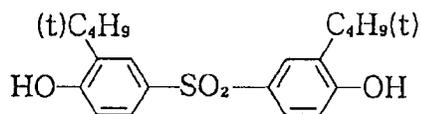
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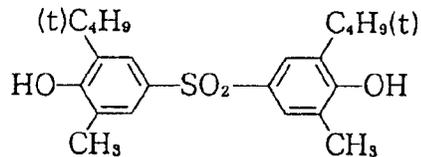
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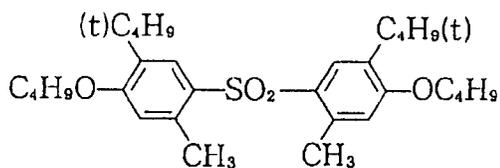
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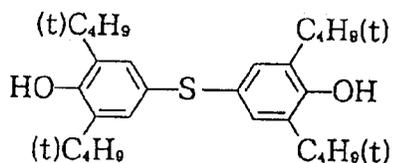
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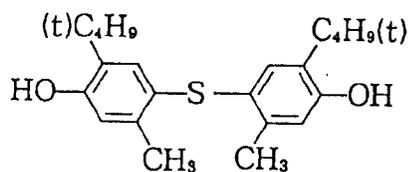
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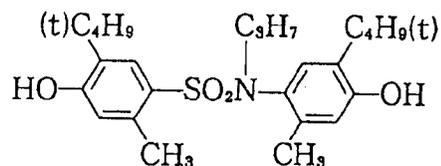
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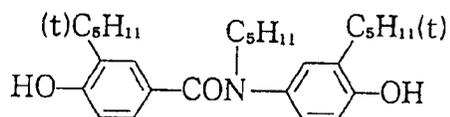
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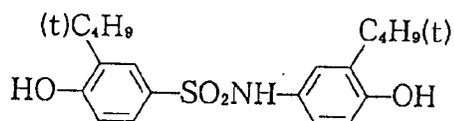
A-239



A-240



A-241



55 The amount of compound A-II is preferably 0.01 to 10 g, still preferably 0.1 to 4.0 g, per gram of the magenta coupler represented by formula M-I. Compounds A-II may be employed either alone or in combination.

In the present invention, use can be made of conventional silver halide emulsions, which may be chemically sensitized in the usual way, or spectrally sensitized to a prescribed wavelength region by means of a sensitizing

dye.

Silver halide emulsions may contain an anti-foggant, a stabilizer and other additives. Gelatin is useful as the binder for emulsions.

5 Emulsions and other hydrophilic colloidal layers may contain a hardener and a plasticizer and a latex of a polymer which is insoluble or sparingly soluble in water. In the case of a color photographic light-sensitive material, an emulsion layer contains a coupler.

10 The light-sensitive material of the invention may also contain a colored coupler (for color compensation), a competitive coupler, and a compound that releases, upon a coupling reaction with an oxidized color developing agent, a photographically effective fragment such as a development accelerator, a bleaching accelerator, a developing agent, a solvent for a silver halide, a toning agent, a hardener, a fogging agent, an anti-foggant, a chemical sensitizer, a spectral sensitizer or a desensitizer.

15 The light-sensitive material of the invention may be provided with auxiliary layers including a filter layer, an anti-halation layer and an anti-irradiation layer. These layers and/or emulsion layers each may contain a dye which can be released from the light-sensitive material or bleached out during development. The light-sensitive material may contain a formalin scavenger, a fluorescent brightener, a matting agent, a lubricant, an image stabilizer, a surfactant, an anti-color fogging agent, a development accelerator, a development retarder and a bleaching accelerator.

Usable supports include polyethylene-laminated paper, polyethylene terephthalate films, baryta paper and cellulose triacetate films.

20 To obtain a dye image, the light-sensitive material of the invention is, after exposure to light, subjected to an ordinary color photographic processing.

EXAMPLES

25 The present invention will be illustrated by Examples.

Example 1

30 In the following examples, the amounts of ingredients are those per square meter of a light-sensitive material, unless otherwise indicated. The amounts of a silver halide and colloidal silver are each indicated as the amount of silver, and the amounts of sensitizing dyes and couplers are those per mole of the silver in each layer.

35 On a cellulose triacetate film support, layers of the following compositions were provided in sequence from the support to prepare a multi-layered color photographic light sensitive material (Sample 1).

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55

Sample 1 (Comparative)

1st layer; Anti-halation layer (HC)

5 A gelatin layer containing black colloidal silver.

Dry thickness 3 μm

2nd layer: Intermediate layer (IL)

10 Gelatin layer containing an emulsified dispersion of 2,5-di-t-octylhydroquinon.

15 Dry thickness 1.0 μm

3rd layer: Low-speed red-sensitive emulsion layer (RL)

20 Monodispersed emulsion of AgBrI containing 3 mol% of silver iodide having an average particle size of 0.3 μm .

(Emulsion I: grain size dispersion 12%)

25 1.8 g

Sensitizing dye I 6.0 x 10⁻⁴ mol

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	Sensitizing dye II	1.0 x 10 ⁻⁴ mol
	Cyan coupler (C-1)	0.06 mol
5	Colored cyan coupler (CC-1)	0.003 mol
	DIR compound (D-1)	0.0015 mol
10	DIR compound (D-2)	0.002 mol
	Diethylphthalate	0.6 g
	Dry thickness	3.5 μm
15	4th layer: High-speed red-sensitive emulsion layer (RH)	
	Monodispersed emulsion of AgBrI containing 3 mol% of silver iodide having an average particle size of 0.5 μm.	
20	(Emulsion II: grain size dispersion 12%)	1.3 g
	Sensitizing dye I	3.0 x 10 ⁻⁴ mol
25	Sensitizing dye II	1.0 x 10 ⁻⁴ mol
	Cyan coupler (C-1)	0.02 mol
	Colored cyan coupler (CC-1)	0.0015 mol
30	DIR compound (D-2)	0.001 mol
	Diethylphthalate	0.2 g
35	Dry thickness	2.5 μm
	5th layer: Intermediate layer (IL)	
	Gelatin layer same as the second layer	
40	Dry thickness	1.0 μm
	6th layer: Low-speed green-sensitive emulsion layer (GL)	
45	Emulsion I	1.5 g
	Sensitizing dye III	2.5 x 10 ⁻⁴ mol
	Sensitizing dye IV	1.2 x 10 ⁻⁴ mol
50		
55		

	Magenta coupler (M-I-2)	0.07 mol
	Colored magenta coupler (CM-1)	0.009 mol
5	DIR compound (D-1)	0.0010 mol
	DIR compound (D-3)	0.0030 mol
10	Tricresyldiphosphate	0.5 g
	Dry thickness	3.5 μm
	7th layer: High speed green sensitive silver halide emulsion	
15	layer (GH)	
	Emulsion II	1.4 g
20	Sensitizing dye III	1.0×10^{-4} mol
	Magenta coupler (M-I-2)	0.020 mol
	Colored magenta coupler (CM-1)	0.002 mol
25	DIR compound (D-3)	0.0010 mol
	Tricresyldiphosphate	0.3 g
	Dry thickness	2.5 μm
30	8th layer: Yellow filter layer (YC)	
	Gelatin layer containing yellow colloidal silver and an	
35	emulsified dispersion of 2,5-di-t-octylhydroquinone	
	Dry thickness	1.2 μm
	9th layer: Low-speed blue-sensitive emulsion layer (BL)	
40	Monodispersed emulsion of AgBrI containing 3 mol% of	
	silver iodide having an average particle size of 0.48 μm .	
45	(Emulsion III: grain size dispersion 12%)	
		0.9 g
	Sensitizing dye V	1.3×10^{-4} mol
50		
55		

	Yellow coupler (Y-1)	0.29 mol
	Tricresylphosphate	0.5 g
5	Dry thickness	3.5 μm
	10th layer: High-speed blue-sensitive emulsion layer (BH)	
	Monodispersed emulsion of AgBrI containing 3 mol% of	
10	silver iodide having an average particle size of 0.8 μm .	
	(Emulsion IV: grain size dispersion 12%)	
15		0.5 g
	Sensitizing dye V	1.0×10^{-4} mol
	Yellow coupler (Y-1)	0.08 mol
20	DIR Compound (D-2)	0.0015 mol
	Tricresylphosphate	0.10 g
25	Dry thickness	2.5 μm

11th layer: 1st protective layer (PRO-1)

Gelatin layer containing silver iodobromide emulsion
 (AgI 2 mol %, average grain size: 0.07 μm) 0.3 g and UV
 absorber UV-1 and UV-2.

Dry thickness 2.0 μm

12th layer: 2nd protective layer (PRO-2)

Gelatin layer containing polymethyl methacrylate
 (average particle size: 1.5 μm) and formalin scavenger
 HS-1.

Dry thickness 1.5 μm

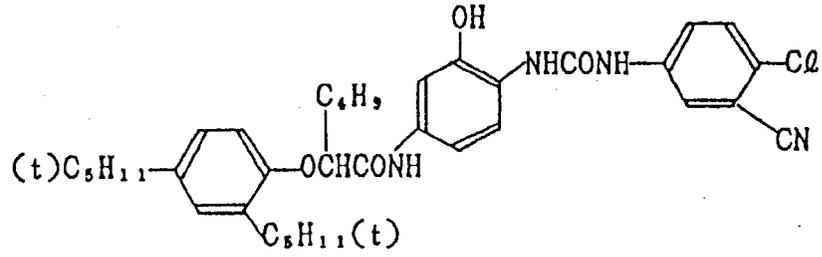
Gelatin hardener H-1 and surfactant were further added to the each layer.

	Sensitizing dye I	Anhydro-5,5'-dichloro-9-ethyl-3,3'-di-(3-sulfopropyl)thiacarbocyaninehydroxide
	Sensitizing dye II	Anhydro-9-ethyl-3,3'-di-(3-sulfopropyl)-4,5,4',5'-dibenzothiacarbocyanine-hydroxide
50	Sensitizing dye III	Anhydro-5,5'-diphenyl-9-ethyl-3,3'-di-(3-sulfopropyl)oxacarbocyaninehydroxide
	Sensitizing dye IV	Anhydro-9-ethyl-3,3'-di-(3-sulfopropyl)-5,6,5'6'-dibenzothiacarbocyaninehydroxide
	Sensitizing dye V	Anhydro-3,3'-di-(3-sulfopropyl)-4,5-benzo-5'-methoxythiacyaninehydroxide

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C - 1

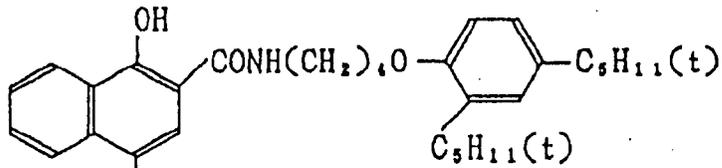
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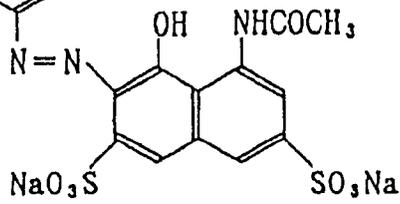
CC - 1

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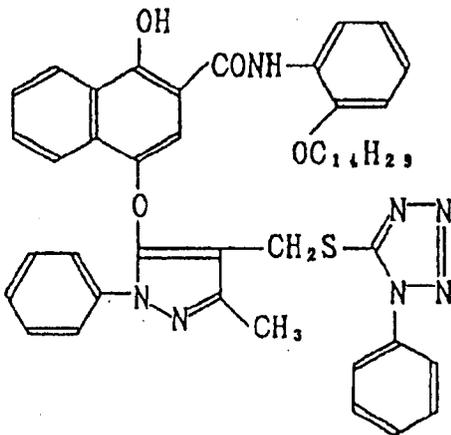
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D - 1

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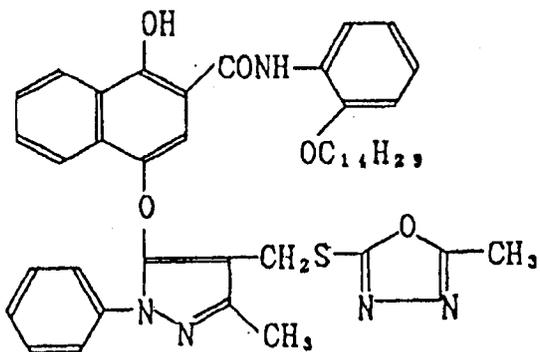
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D - 2

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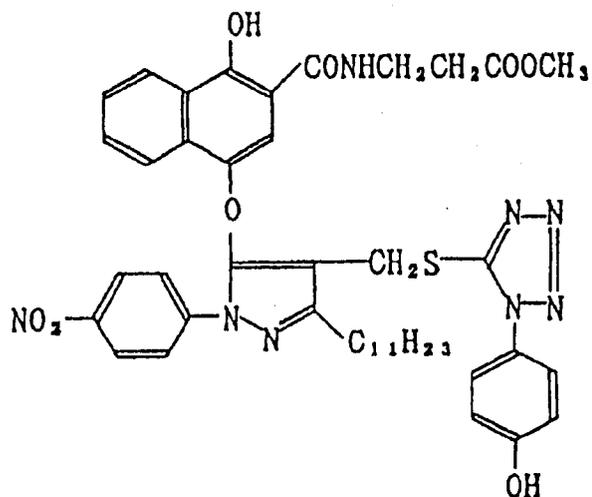
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D - 3

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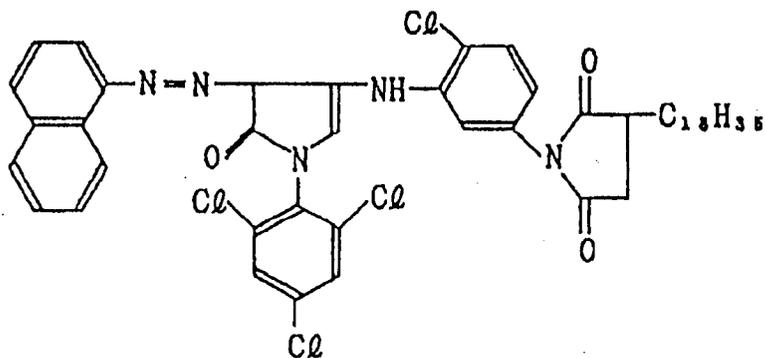


CM - 1

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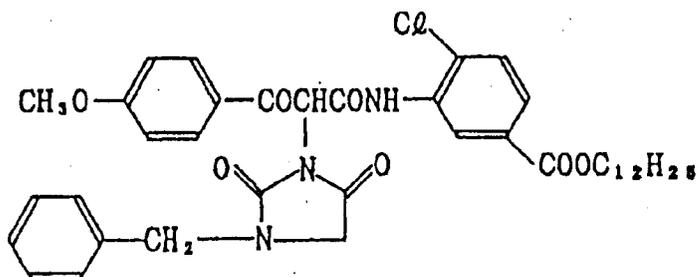
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Y - 1

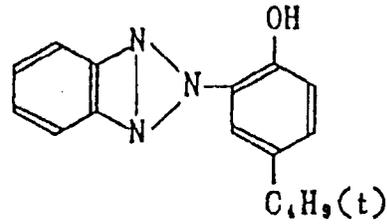
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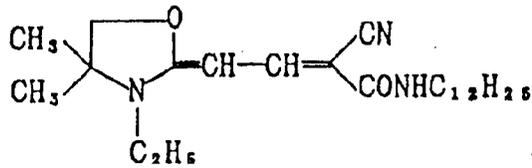
UV - 1

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UV - 2

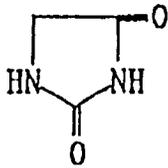
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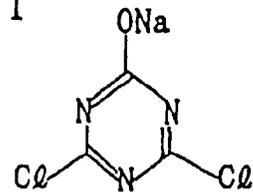
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HS - 1

20



H - 1



25

Sample Nos. 2 to 17 were prepared in the same manner as in the preparation of Sample No. 1, except that the magenta couplers in the 6th and 7th layers (I-2) were replaced by those shown in Table 1.

Each resulted sample was exposed wedgewize in a conventional manner, and processed according to the following procedures.

30

Processing procedure (38°C)	Processing time
Color developing	3'15"
Bleaching	6'30"
Water washing	3'15"
Fixing	6'30"
Water washing	3'15"
Stabilizing	1'30"
Drying	

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EP 0 515 128 A1

<Color Developer>

	4-amino-3-methyl-N-ethyl-N- (β -hydroxyethyl)	
5	aniline sulfate	4.75 g
	Sodium sulfite anhydride	4.25 g
10	Hydroxylamine 1/2sulfate	2.0 g
	Potassium carbonate anhydride	37.5 g
	Sodium bromide	1.3 g
15	Sodium nitrilotriacetate (monohydrate)	2.5 g
	Potassium hydroxide	1.2 g

20 Water was added to make the total quantity 1 l, and pH was controlled to 10.0.

<Bleacher>

25	Ferric ammonium 1,3-diaminopropanetetraacetate (III)	100 g
30	Diammonium ethylenediaminetetraacetate	10.0 g
	Ammonium bromide	150.0 g
35	Glacial acetic acid	10.0 g

Water was added to make the total quantity 1 l, and pH was controlled to 6.0.

<Fixer>

40		
	Ammonium thiosulfate (50% aquaous solution)	162 ml
45	Sodium sulfite anhydride	12.4 g

Water was added to make the total quantity 1 l. and pH was adjusted to 6.5.

<Stabilizer>

50		
	Formalin (37% aquaous solution)	5.0 ml
	Konidax (produced by Konica Corp.)	7.5 ml
55		

Water added to 1 l.

[Evaluation for Preservability]

For each of the processed samples, transmittance density was measured by a densitometer model 310 made by X-rite Copr. with status M filter and thereby $D/(-\log E)$ characteristics curve is drawn. For the characteristics curve measured density through green light for each of the samples γ_1 , the gradation between the point at the density of 1.5 and the point having higher density by $\Delta\log E = 1.0$, γ_2 , the gradation between the point at the density of 1.0 and the point having higher density by $\Delta\log E = 1.0$, and γ_3 , the gradation between the point at the density of 1.0 and the point having higher density by $\Delta\log E = 1.0$ were shown in Table 1.

Table 1

Sample	The 6th layer		The 7th layer		γ_1	γ_2	γ_3
	Magenta Compound	Coupler Amount*	Magenta Compound	Coupler Amount*			
1	M-I-2	0.05	M-I-2	0.02	0.73	0.80	0.61
2	M-I-4	0.05	M-I-4	0.02	0.75	0.82	0.59
3	M-I-10	0.05	M-I-10	0.02	0.72	0.79	0.62
4	M-I-43	0.05	M-I-43	0.02	0.69	0.80	0.57
5	M-I-4	0.04	M-I-4	0.015	0.72	0.74	0.70
	M-II-1	0.03	M-II-1	0.015			
6	M-I-4	0.04	M-I-4	0.015	0.73	0.75	0.73
	M-II-19	0.03	M-II-19	0.015			
7	M-I-4	0.04	M-I-4	0.015	0.71	0.74	0.72
	M-II-23	0.03	M-II-23	0.015			
8	M-I-4	0.04	M-I-4	0.015	0.73	0.73	0.70
	M-II-26	0.03	M-II-26	0.015			
9	M-I-4	0.04	M-I-4	0.015	0.71	0.73	0.72
	M-II-27	0.03	M-II-27	0.015			
10	M-I-2	0.04	M-I-2	0.015	0.69	0.72	0.69
	M-I-5	0.03	M-I-5	0.010			
11	M-I-10	0.04	M-I-10	0.015	0.72	0.74	0.74
	M-II-13	0.03	M-II-13	0.010			
12	M-I-10	0.04	M-I-10	0.015	0.73	0.74	0.73
	M-II-19	0.03	M-II-19	0.010			
13	M-I-9	0.035	M-I-9	0.015	0.76	0.77	0.74
	M-II-19	0.03	M-II-19	0.010			

Sample	<u>The 6th layer</u>		<u>The 7th layer</u>		γ_1	γ_2	γ_3	
	<u>Magenta Compound</u>	<u>Coupler Amount*</u>	<u>Magenta Compound</u>	<u>Coupler Amount*</u>				
5	14	M-I-19	0.04	M-I-19	0.015	0.70	0.73	0.69
		M-II-19	0.03	M-II-19	0.010			
10	15	M-I-43	0.04	M-I-43	0.015	0.69	0.72	0.72
		M-II-34	0.03	M-II-34	0.010			
15	16	M-I-43	0.04	M-I-43	0.015	0.69	0.70	0.68
		M-II-35	0.03	M-II-35	0.015			
15	17	M-I-36	0.04	M-I-36	0.012	0.70	0.72	0.70
		M-II-19	0.03	M-II-19	0.015			

*Amount is shown in mol/1 mol silver.

20 As apparent from the result shown in the Table 1, the samples 1 to 4 are not preferable because they have waviness in the gradation between the low density and the high density portion. On the other hand the samples 5 to 17 of the present invention are preferable because they have the smooth and straight gradations having substantially the same value of the gradations γ_1 , γ_2 and γ_3 .

25 Example 2.

Samples 1 to 17 prepared in the Example 1 are exposed to white light and processed as the same as Example 1. The resulted samples were used for printing by a printer A so that the printed samples have a reflective density of 18.5 gray color to obtain the print samples 1A to 17A.

30 Next, the similar test was performed wherein the printer A was replaced with the printer B having a different detector characteristics at the region of green area, and the printed samples 1B to 17B were obtained to detect the variation of hue depending on the printers. The results are summarized in Table 2.

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Table 2

	<u>Sample</u>	<u>Hue variation inter printer</u>
5	1	D
	2	D
10	3	D
	4	C
	5	B
15	6	B
	7	B
	8	B
20	9	B
	10	A
25	11	A
	12	A
	13	B
30	14	A
	15	A
35	16	A
	17	A

40 Degree of hue variation inter printer was evaluated
visually by ten panelers.

45 A: Very small B: Small C: Large D: Very large

As is evident from the results in Table 2, the Samples 5 to 17 show smaller degree of hue variation than samples 1 to 4, and are improved.

50 Example 3

In the following examples, the amounts of ingredients are those per square meter of the light-sensitive material, unless otherwise indicated. The amounts of a silver halide and colloidal silver are each indicated as the amount of silver.

55 One side (the right side) of a cellulose triacetate film support was subbed. On the other side (the opposite side) of the support, layers of the following compositions were provided in sequence.

-Opposite side

1st layer

5 Alumina sol AS-100 (aluminum oxide, manufactured by Nissan
Chemical Industry, Ltd.) 0.8 g

10 2nd layer

Cellulose acetate 100 g

Stearic acid 10 mg

15 Finely divided silica

(average particle size: 0.2 μm) 50 mg

20 Then, on the right side of the support that had been subbed, layers of the following compositions were provided in sequence, whereby a multilayer color photographic light-sensitive material (Sample No. 101) was obtained.

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-Right side

1st layer: Anti-halation layer (HC)

5	Black colloidal silver	0.15 g
	UV absorber (UV-1)	0.20 g
10	Colored cyan coupler (CC-1)	0.02 g
	High-boiling solvent (Oil-1)	0.20 g
	High-boiling solvent (Oil-2)	0.20 g
15	Gelatin	1.6 g

2nd layer: Intermediate layer (IL-1)

20	Gelatin	1.3 g
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3rd layer: Low-speed red-sensitive emulsion layer (R-L)

	Silver iodobromide emulsion	
25	(average particle size: 0.3 μm , average iodine content: 2.0 mol%)	0.4 g

	Silver iodobromide emulsion	
30	(average particle size: 0.4 μm , average iodine content: 8.0 mol%)	0.3 g

35	Sensitizing dye (S-1)	3.2×10^{-4} (mol/mol silver)
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	Sensitizing dye (S-2)	3.2×10^{-4} (mol/mol silver)
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	Sensitizing dye (S-3)	0.2×10^{-4} (mol/mol silver)
--	-----------------------	---------------------------------------

40	Cyan coupler (C-1)	0.50 g
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	Cyan coupler (C-2)	0.13 g
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45	Colored cyan coupler (CC-1)	0.07 g
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	DIR compound (D-1)	0.006 g
	DIR compound (D-22)	0.01 g
5	High-boiling solvent (Oil-1)	0.55 g
	Gelatin	1.0 g
	4th layer: High-speed red-sensitive emulsion layer (R-H)	
10	Silver iodobromide emulsion	
	(average particle size: 0.7 μm , average iodine content:	
15	7.5 mol%)	0.9 g
	Sensitizing dye (S-1)	1.7×10^{-4} (mol/mol silver)
	Sensitizing dye (S-2)	1.6×10^{-4} (mol/mol silver)
20	Sensitizing dye (S-3)	0.1×10^{-4} (mol/mol silver)
	Cyan coupler (C-2)	0.23 g
25	Colored cyan coupler (CC-1)	0.03 g
	DIR compound (D-22)	0.02 g
	High-boiling solvent (Oil-1)	0.25 g
30	Gelatin	1.0 g
	5th layer: Intermediate layer (IL-2)	
35	Gelatin	0.8 g
	6th layer: Low-speed green-sensitive emulsion layer (G-L)	
	Silver iodobromide emulsion	
40	(average particle size: 0.4 μm , average iodine content:	
	8.0 mol%)	0.6 g
	Silver iodobromide emulsion	
45	(average particle size: 0.3 μm , average iodine content:	
	2.0 mol%)	0.2 g
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	Sensitizing dye (S-4)	6.7×10^{-4} (mol/mol silver)	
	Sensitizing dye (S-5)	0.8×10^{-4} (mol/mol silver)	
5	Magenta coupler (M-I-4)		0.50 g
	Colored magenta coupler (CM-1)		0.10 g
10	DIR compound (D-23)		0.02 g
	High-boiling solvent (Oil-2)		0.7 g
	Gelatin		1.0 g
15	7th layer: High-speed green-sensitive emulsion layer (G-H)		
	Silver iodobromide emulsion (average grain size: $0.7 \mu\text{m}$; average iodine content: 7.5 mol%)		0.9 g
20	Sensitizing dye (S-6)	1.1×10^{-4} (mol/mol silver)	
	Sensitizing dye (S-7)	2.0×10^{-4} (mol/mol silver)	
25	Sensitizing dye (S-8)	0.3×10^{-4} (mol/mol silver)	
	Magenta coupler (M-I-4)		0.25 g
	Colored magenta coupler (CM-I)		0.04 g
30	DIR compound (D-23)		0.004 g
	High-boiling solvent (Oil-2)		0.35 g
35	Gelatin		1.0 g
	8th layer: Yellow filter layer (YC)		
	Yellow colloidal silver		0.1 g
40	Additive (HS-1)		0.07 g
	Additive (HS-2)		0.07 g
45	Additive (SC-1)		0.12 g
	High-boiling solvent (Oil-2)		0.15 g
	Gelatin		1.0 g
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	9th layer: Low-speed blue-sensitive emulsion layer (B-L)	
5	Silver iodobromide emulsion (average grain size: 0.3 μm ; average iodine content: 2.0 mol%)	0.25 g
10	Silver iodobromide emulsion (average grain size: 0.4 μm ; average iodine content: 8.0 mol%)	0.25 g
	Sensitizing dye (S-9)	5.8×10^{-4} (mol/mol silver)
	Yellow coupler (Y-1)	0.6 g
15	Yellow coupler (Y-2)	0.32 g
	DIR compound (D-1)	0.003 g
20	DIR compound (D-22)	0.006 g
	High-boiling solvent (Oil-2)	0.18 g
	Gelatin	1.3 g
25	10th layer: High-speed blue-sensitive emulsion layer (B-H)	
	Silver iodobromide emulsion (average grain size: 0.8 μm ; average iodine content: 8.5 mol%)	0.5 g
30	Sensitizing dye (S-10)	3×10^{-4} (mol/mol silver)
	Sensitizing dye (S-11)	1.2×10^{-4} (mol/mol silver)
35	Yellow coupler (Y-1)	0.18 g
	Yellow coupler (Y-2)	0.10 g
	High-boiling solvent (Oil-2)	0.05 g
40	Gelatin	1.0 g
	11th layer: 1st protective layer (PRO-1)	
45	Silver iodobromide emulsion (average grain size: 0.08 μm)	0.3 g
	UV absorber (UV-1)	0.07 g
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	UV absorber (UV-2)	0.10 g
	Additive (HS-1)	0.2 g
5	Additive (HS-2)	0.1 g
	High-boiling solvent (Oil-1)	0.07 g
	High-boiling solvent (Oil-3)	0.07 g
10	Gelatin	0.8 g
	12th layer: 2nd protective layer (PRO-2)	
15	Compound A	0.04 g
	Compound B	0.004 g
	Polymethyl methacrylate	
20	(average particle size: 3 μm)	0.02 g
	Methyl methacrylate/ethyl methacrylate/methacrylic acid	
25	copolymer (weight ratio: 3:3:4, average particle size: 3 μm)	0.13 g

30 The silver iodobromide emulsion contained in the 10th layer was prepared by the double-jet method as described below.

To solution G-1, of which the temperature, pAg and pH had been kept at 70°C, 7.8 and 7.0, respectively, a 0.34 mol-equivalent amount of seed grains (average grain size: 0.33 μm , silver iodide content: 2 mol%) were added with stirring. Then, solutions H-1 and S-1 were added over a period of 86 minutes at an accelerated flow rate so that the flow rate immediately before the start of addition would be 3.6 times as high as that immediately after the start of addition. The ratio of the flow rate of solution H-1 to that of S-1 was kept at 1:1. As a result, an internal, high-iodine layer (core) was formed. Subsequently, while keeping pAg and pH at 10.1 and 6.0, respectively, solutions H-2 and S-2 were added over a period of 65 minutes at an accelerated flow rate so that the flow rate immediately before the start of addition would be 5.2 times as high as that immediately after the start of addition. The ratio of the flow rate of solution H-1 to that of S-1 was kept at 1:1. As a result, an external, low-iodine layer (shell) was formed.

40 During the formation of the silver halide grains, pAg and pH were controlled with an aqueous potassium bromide solution and a 56% aqueous acetic acid solution. The so-formed grains were washed with water by the conventional flocculating method. Gelatin was then added to make the grains re-dispersed, and pH and pAg were controlled at 40°C to 5.8 and 8.06, respectively.

45 The emulsion consisted of monodispersed, octahedral silver iodobromide grains with an average grain size of 0.80 μm , a variation coefficient of 12.4% and a silver iodide content of 8.5 mol%.

<G-1>

50	Ossein gelatin	100.0 g
	Compound-I	25.0 ml
55	28% aqueous ammonium solution	440.0 ml
	56% aqueous acetic acid solution	660.0 ml

Water was added to make the total quantity 5,000.0 ml.

<H-1>

- 5 Ossein gelatin 82.4 g
 Potassium bromide 151.6 g
 Potassium iodide 90.6 g
 Water was added to make the total quantity 1030.5 ml.

10 <S-1>

- Silver nitrate 309.2 g
 28% aqueous ammonia solution Equivalent
 Water was added to make the total quantity 1030.5 ml.

15

<H-2>

- Ossein gelatin 302.1 g
 Potassium bromide 770.0 g
 20 Potassium iodine 33.2 g
 Water was added to make the total quantity of 3776.8 ml.

<S-2>

- 25 Silver nitrate 1133.0 g
 28% aqueous ammonia solution Equivalent amount
 Water was added to make the total quantity 3776.8 ml.

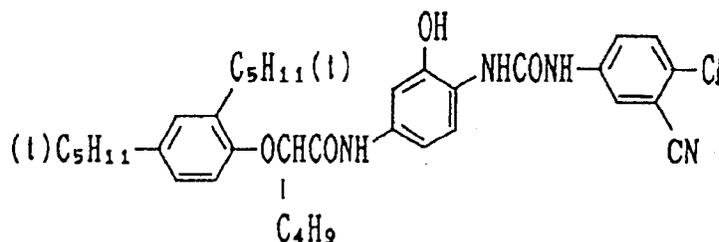
Emulsions differing in average grain size and silver iodide content were prepared in substantially the same manner as mentioned above, except that the average size of seed grains, temperature, pAg, pH, flow rate, addition time and halide composition were varied.

Each of the resulting emulsions was a core/shell type emulsion consisting of monodispersed grains with a variation coefficient of 20% or less. Each emulsion was chemically ripen to an optimum level in the presence of chloroauric acid and ammonium thiocyanate, and then spectrally sensitized with a sensitizing dye, 4-hydroxy-6-methyl-1,3,3a,7-tetrazaindene and 1-phenyl-5-mercaptotetrazole.

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C - 1

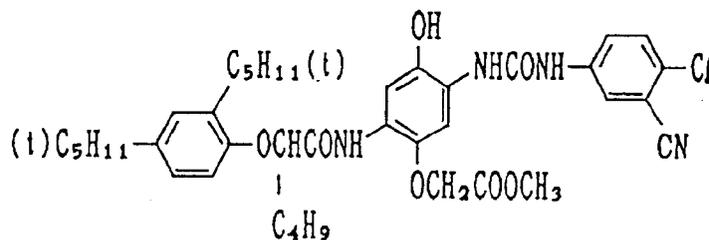
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C - 2

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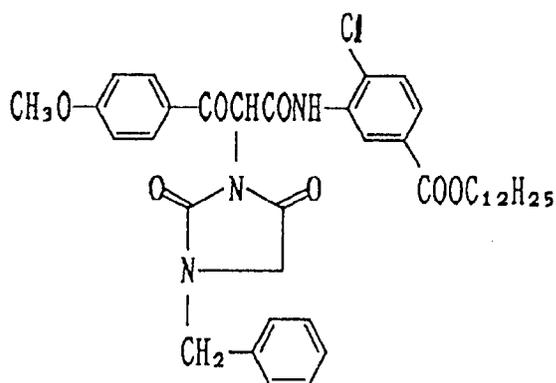
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Y-1

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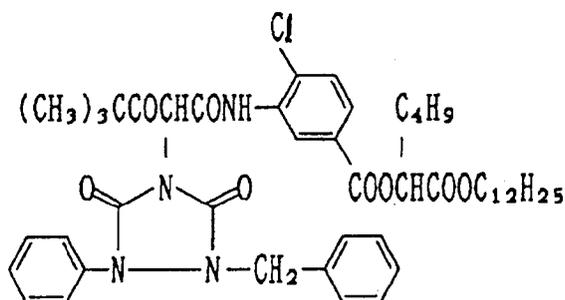
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Y-2

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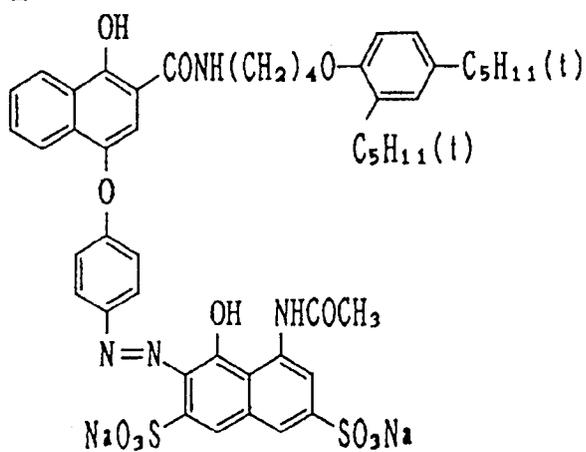


CC-1

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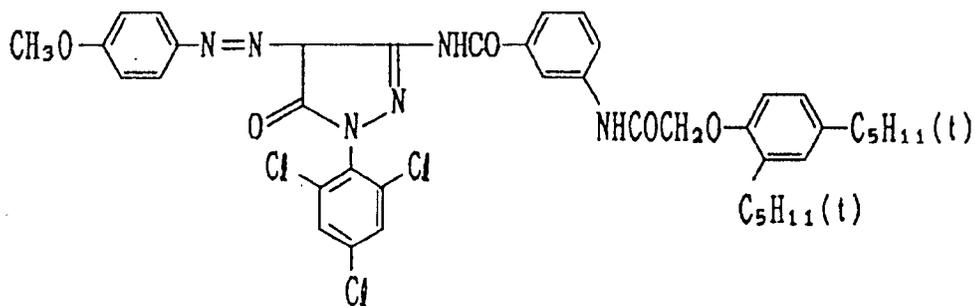


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CM-1

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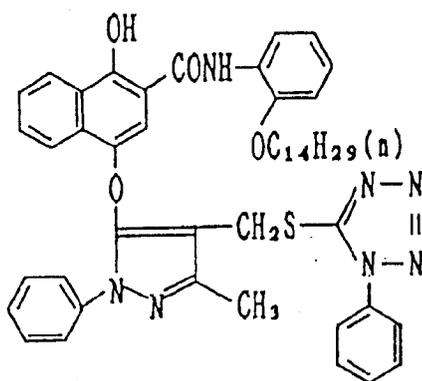


D-1

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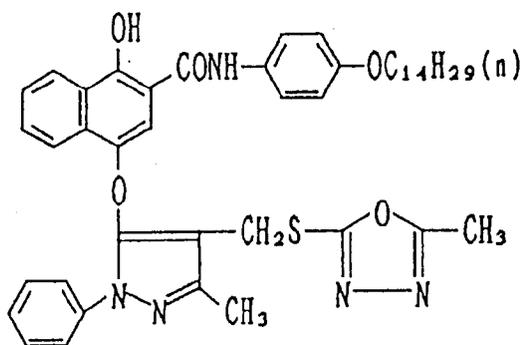


D-22

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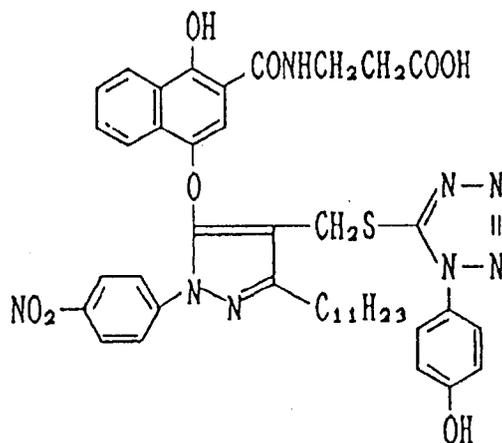


D-23

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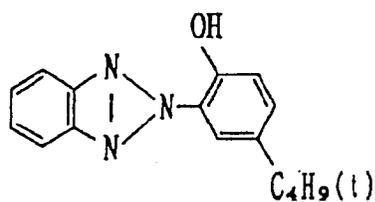
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UV-1

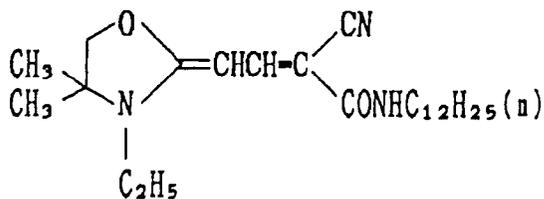
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UV-2

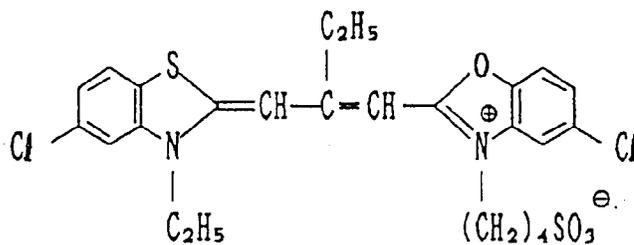
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S-1

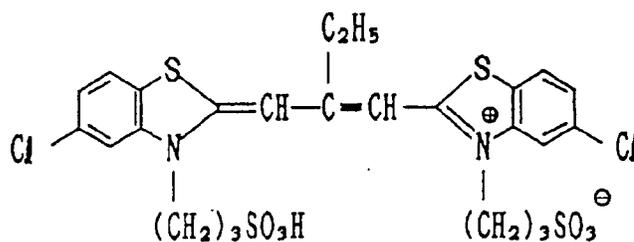
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S-2

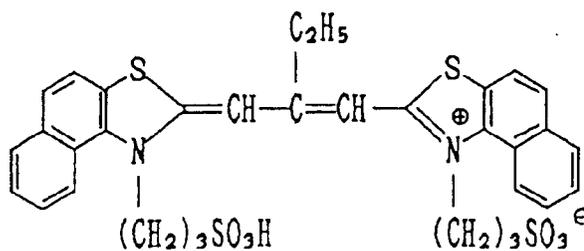
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S-3

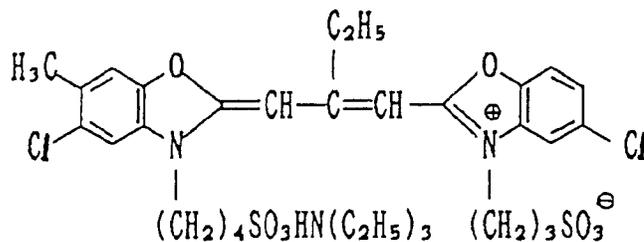
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S-4

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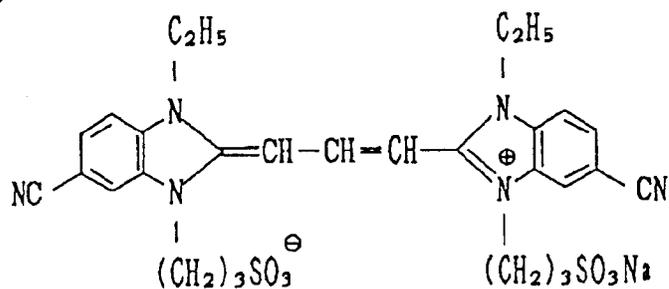


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S - 5

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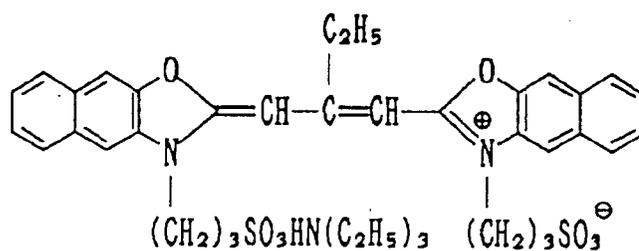
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S - 6

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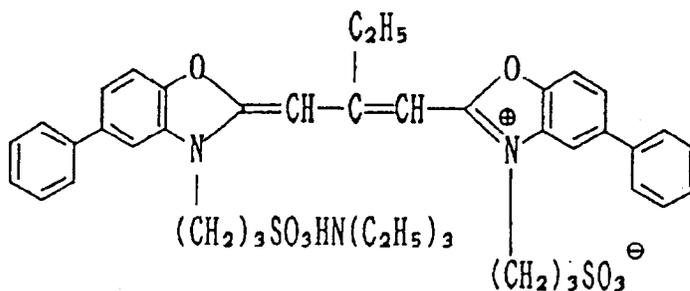


S - 7

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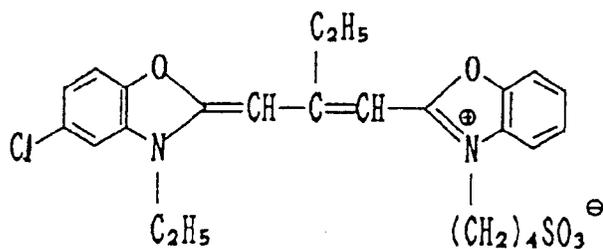
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S - 8

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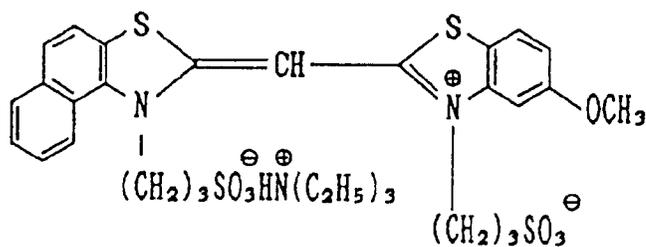
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S - 9

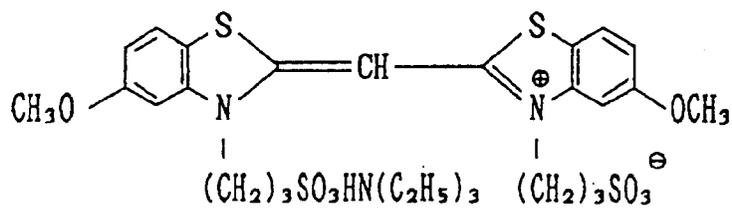
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S-10

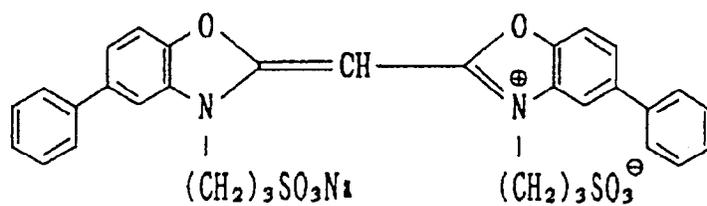
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S-11

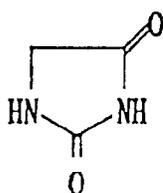
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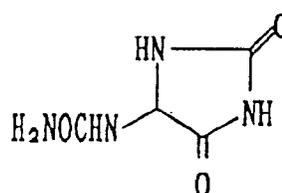
HS-1

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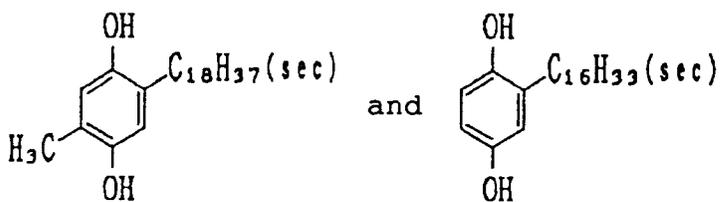
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HS-2



SC-1

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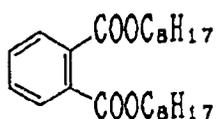
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Mixture of 2:3

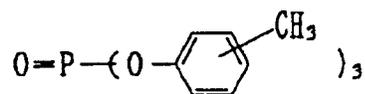
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Oil-1

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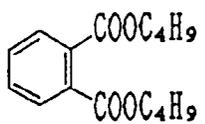
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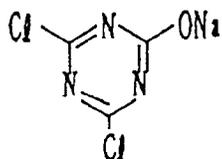
O i l - 3

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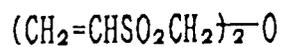
H - 1

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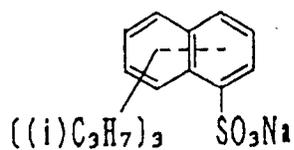
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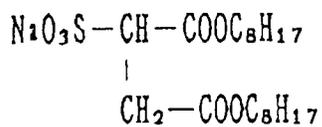
S U - 1

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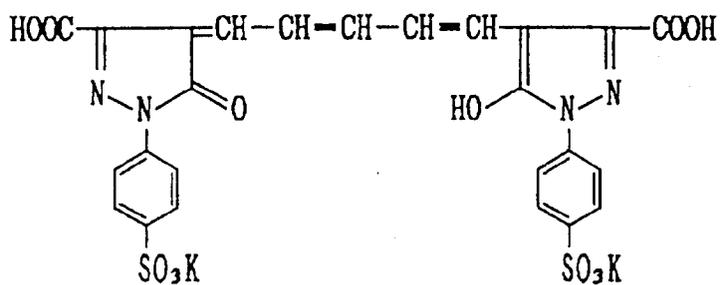
S U - 2



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A I - 1

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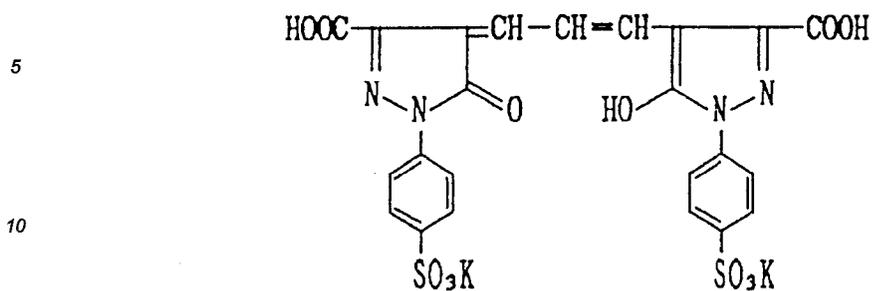


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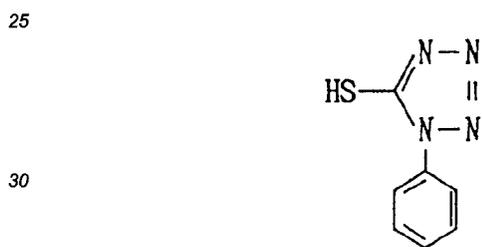
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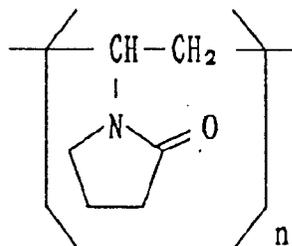
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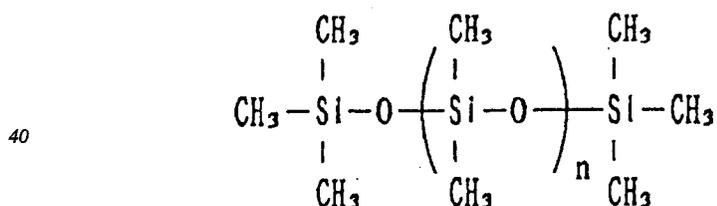
25 AF - 1



AF - 2

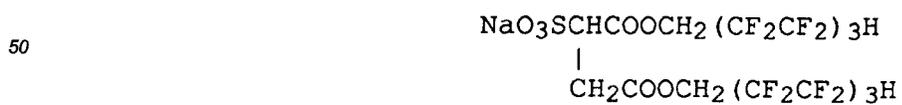


35 Compound A



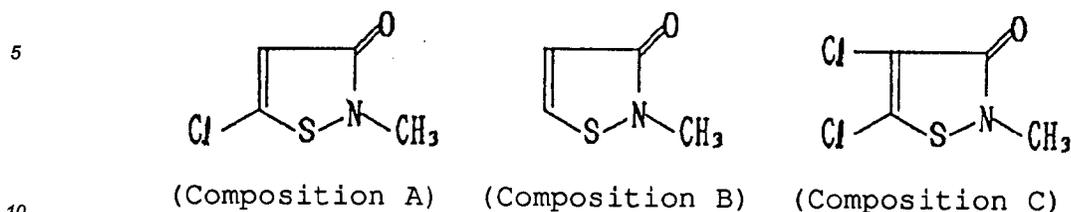
45 Weight average molecular weight = 30,000

Compound B



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DI-1



Composition A:Composition B:Composition C
= 50:46:4 (mol ratio)

15 The so-obtained Sample No. 101 also contained compounds Su-1 and Su-2, a viscosity controller, hardeners H-1 and H-2, a stabilizer ST-1, anti-foggants AF-1 and AF-2 (two kinds of AF-2 were employed; one had a weight average molecular weight of 10,000 and the other with a weight average molecular weight of 1,100,000), dyes AI-1 and AI-2 and compound DI-1 (content: 9.4 mg/m²).

20 Sample Nos. 102 to 110 were prepared in substantially the same manner as in the preparation of Sample No. 101, except that the magenta couplers in the 6th and 7th layers (M-I-4) and the high-boiling solvent (Oil-2) were replaced by those shown in Table 3.

Each sample was exposed to white light through a step wedge, and processed according to the following procedures. Each of the processed sample was examined for the fogging and sensitivity of the green-sensitive layer.

25

Procedure	Time	Temperature	Repl. Amount*
Color developing	3'15"	38 ± 0.3°C	780 ml
Bleaching	45"	38 ± 2.0°C	150 ml
Fixing	1'30"	38 ± 2.0°C	830 ml
35 Stabilizing	60"	38 ± 5.0°C	830 ml
Drying	1'	55 ± 5.0°C	

* The amount of a replenisher is that per square meter
40 of a light-sensitive material.

The compositions of the processing liquids were as follows.

45 <Color Developer>

Water	800 ml
50 Potassium carbonate	30 g
Sodium bicarbonate	2.5 g

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	Potassium sulfite	3.0 g
	Sodium bromide	1.3 g
5	Potassium iodide	1.2 mg
	Hydroxylamine sulfate	2.5 g
10	Sodium chloride	0.6 g
	4-amino-3-methyl-N-ethyl-N-(β -hydroxyethyl)	
	aniline sulfate	4.5 g
15	Diethylenetriaminepentacetic acid	3.0 g
	Potassium hydroxide	1.2 g

20 Water was added to make the total quantity 1 l, and pH was controlled to 10.06 with potassium hydroxide or 20% sulfuric acid.

<Color Developer Replenisher>

25	Water	800 ml
	Potassium carbonate	35 g
30	Sodium bicarbonate	3 g
	Potassium sulfite	5 g
	Sodium bromide	0.4 g
35	Hydroxylamine sulfate	3.1 g
	4-amino-3-methyl-N-ethyl-N-(β -hydroxyethyl)	
40	aniline sulfate	6.3 g
	Potassium hydroxide	2 g
	Diethylenetriaminepentacetic acid	3.0 g

45 Water was added to make the total quantity 1 l, and pH was controlled to 10.18 with potassium hydroxide or 20% sulfuric acid.

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<Bleacher>

	Water	700 ml
5	Ferric ammonium 1,3-diaminopropanetetraacetate (III)	
		125 g
10	Ethylenediaminetetracetic acid	2 g
	Sodium nitrate	40 g
	Ammonium bromide	150 g
15	Glacial acetic acid	40 g

Water was added to make the total quantity 1 l, and pH was controlled to 4.4 with aqueous ammonia or glacial acetic acid.

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<Bleacher Replenisher>

	Water	700 ml
25	Ferric ammonium 1,3-diaminopropanetetraacetate (III)	
		175 g
30	Ethylenediaminetetracetic acid	2 g
	Silver nitrate	50 g
	Ammonium bromide	200 g
35	Glacial acetic acid	56 g

After adjusting pH to 4.0 with aqueous ammonia or glacial acetic acid, water was added to make the total quantity 1 l.

40

<Fixer>

	Water	800 ml
45	Ammonium thiocyanate	120 g
	Ammonium thiosulfate	150 g
50	Sodium sulfite	15 g
	Ethylenediaminetetracetic acid	2 g

After adjusting pH to 6.2 with aqueous ammonia or glacial acetic acid, water was added to make the total quantity 1 l.

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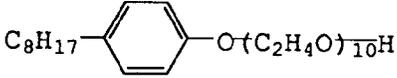
<Fixer Replenisher>

	Water	800 ml
	Ammonium thiocyanate	150 g
5	Ammonium thiosulfate	180 g
	Sodium sulfite	20 g
	Ethylenediaminetetracetic acid	2 g

After adjusting pH to 6.5 with aqueous ammonia or glacial acetic acid, water was added to make the total quantity 1 l.

10

<Stabilizer and Stabilizer Replenisher>

15	Water	900 ml
	Compound	
		
20		2.0 g
	Dimethylol urea	0.5 g
	Hexamethylene tetramine	0.2 g
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	1,2-benzisothiazoline-3-on	0.1 g
	Siloxane (L-77, manufactured by UCC)	0.1 g
30	Aqueous ammonia	0.5 ml

Water was added to make the total quantity 1, and pH was adjusted to 8.5 with 50% aqueous ammonia.

35 [Evaluation for Preservability]

Sample Nos. 101 to 111 were left at 40°C and RH80% for 7 days for forced deterioration, exposed to white light through a step wedge (specifically designed for sensitometry) and processed in the same way as mentioned above. For each of the deteriorated samples, the fogging density and sensitivity of the green-sensitive layer were measured. An increase in fogging density Δ Fog after the forced deterioration was obtained. Sensitivity was expressed as a value relative to that before the forced deterioration which was taken as 100.

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[Evaluation for Processing Stability]

45 Sample Nos. 101 to 110 were exposed to white light through a step wedge (specifically designed for sensitometry), and processed in the same way as mentioned above, except that the pH of the developer was varied to 10.4 and 10.0. For each of the processed samples, to examine the influence of a change in processing conditions on photographic properties, a change in γ value caused by the change in the pH of the developer, expressed as the ratio of the γ value obtained when the developer had a pH of 10.0 (A) to that obtained when the developer had a pH of 10.4 (B), was obtained using the following equation:

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$$\text{Percentage change in } \gamma \text{ value} = \{(B/A) - 1\} \times 100$$

Smaller values mean better processing stability.

[Influence of Change in Type of Printer on Hue]

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Sample Nos. 101 to 110 were exposed to white light equally, and processed in the same way as mentioned above, except that the pH of the developer was varied to 10.18. Each of the processed samples was printed on color paper by means of printer A in such a manner that gray with a reflectance density of 0.5 was formed,

whereby photoprints 101A to 110A were obtained.

Printing of the processed samples was performed in the same way as mentioned above, except that use was made of printer B which differed from printer A in the detector for spectral sensitivity to the green region of a spectrum, whereby photoprints 101B to 110B were obtained. Photoprints 101B to 110B were respectively

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compared with photoprints 101A to 110A by ten panelers to examine how the hue of the gray color was changed. The results of the evaluation are summarized in Table 4.

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Table 3

Sample	Magenta coupler in 6th layer				Magenta coupler in 7th layer				High boiling point solvent			
	Compound		Amt. *		Compound		Amt. *		Compound		Amt. *	
	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *
101	M-I-4	0.50	-	-	M-I-4	0.25	-	-	Oil-2	0.70	Oil-2	0.35
102	M-I-4	0.50	M-II-19	0.40	M-I-4	0.25	M-II-19	0.20	I-69	0.70	I-69	0.35
103	M-I-4	0.50	M-II-26	0.45	M-I-4	0.25	M-II-26	0.20	I-5	0.70	I-5	0.35
104	M-I-4	0.50	M-II-34	0.45	M-I-4	0.25	M-II-34	0.20	I-71	0.70	I-69	0.35
105	M-I-10	0.60	M-II-19	0.50	M-I-10	0.30	M-II-19	0.30	I-69	0.70	I-69	0.35
106	M-I-10	0.60	M-II-26	0.50	M-I-10	0.30	M-II-26	0.30	I-23	0.70	I-69	0.35
107	M-I-10	0.60	M-II-34	0.50	M-I-4	0.25	M-II-34	0.25	I-70	0.70	I-70	0.35
108	M-I-44	0.80	M-II-19	0.50	M-I-44	0.42	M-II-19	0.35	I-69	0.70	I-69	0.35
109	M-I-44	0.80	M-II-26	0.50	M-I-44	0.42	M-II-26	0.35	I-5	0.70	I-5	0.35
110	M-I-44	0.80	M-II-19	0.50	M-I-4	0.25	M-II-34	0.20	I-70	0.70	I-70	0.35

* Each amount is indicated by g/lm²

Table 4

Sample	<u>Preservability</u>		<u>Gradation</u> <u>Variation</u>	<u>Hue Change</u>
	<u>ΔFog</u>	<u>Relative Speed</u>		
101	0.18	74	35	D
102	0.08	90	25	B
103	0.07	88	24	C
104	0.09	89	26	C
105	0.10	91	24	A
106	0.08	87	28	A
107	0.11	90	28	B
108	0.10	88	27	B
109	0.09	89	29	B
110	0.11	90	28	C

Degree of change in hue caused by a change in the type of a printer:

A: Very small B: Small C: Large D: Very large

As is evident from the results, the sample No. 101 was fogged and desensitized when left at deteriorating conditions, and its photographic properties were varied considerably with a change in processing conditions as well as a change in the type of a printer.

The samples Nos. 102 to 110 were excellent in preservability and processing stability, and could produce photoprints of the same hue irrespective of the type of a printer.

Example 4

Multilayer color photographic light-sensitive materials (Sample Nos. 111 to 120) were prepared in the same manner as in the preparation of Sample No. 101, except that the magenta coupler in the 6th and 7th layers (M-I-4) and the high-boiling solvent (Oil-2) were varied to those shown in Table 5.

The so-obtained samples were evaluated in the same manner as in Example 1, and the results obtained are summarized in Table 6.

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Table 5

Sample	Magenta coupler in 6th layer			Magenta coupler in 7th layer			High boiling point solvent					
	Compound	Amt.*	Compound	Amt.*	Compound	Amt.*	Compound	Amt.*	Compound	Amt.*		
101	M-I-4	0.50	-	-	M-I-4	0.25	-	-	Oil-2	0.70	Oil-2	0.35
111	M-I-4	0.50	M-II-19	0.40	M-I-4	0.25	M-II-19	0.20	II-1	0.70	II-1	0.35
112	M-I-4	0.50	M-II-19	0.40	M-I-4	0.25	M-II-19	0.20	II-105	0.70	II-105	0.35
113	M-I-4	0.50	M-II-26	0.45	M-I-4	0.25	M-II-26	0.20	II-1	0.70	II-1	0.35
114	M-I-4	0.50	M-II-34	0.45	M-I-4	0.25	M-II-34	0.20	II-105	0.70	II-105	0.35
115	M-I-10	0.60	M-II-19	0.50	M-I-10	0.30	M-II-19	0.30	II-1	0.70	II-105	0.35
116	M-I-10	0.60	M-II-26	0.50	M-I-10	0.30	M-II-26	0.30	II-105	0.70	II-105	0.35
117	M-I-10	0.60	M-II-34	0.50	M-I-4	0.25	M-II-34	0.25	II-32	0.70	II-32	0.35
118	M-I-44	0.80	M-II-19	0.50	M-I-44	0.42	M-II-19	0.35	II-1	0.70	II-105	0.35
119	M-I-44	0.80	M-II-26	0.50	M-I-44	0.42	M-II-26	0.35	II-32	0.70	II-32	0.35
120	M-I-44	0.80	M-II-19	0.50	M-I-4	0.25	M-II-34	0.20	II-1	0.70	II-1	0.35

* Each amount is indicated by g/lm²

Table 6

Sample	Preservability		Gradation	Hue Change
	Δ Fog	Relative Speed	Variation	
101	0.18	74	35	D
111	0.12	88	18	A
112	0.11	86	16	A
113	0.13	85	26	B
114	0.11	87	18	B
115	0.12	86	21	A
116	0.11	86	21	A
117	0.12	88	21	B
118	0.13	87	25	B
119	0.13	85	22	B
120	0.11	86	24	C

Degree of change in hue caused by a change in the type of a printer:

A: Very small B: Small C: Large D: Very large

As is evident from the results, the sample No. 101 was fogged and desensitized when left at deteriorating conditions, and its photographic properties were varied considerably with a change in processing conditions as well as a change in the type of a printer.

The samples Nos. 111 to 120 were excellent in preservability and processing stability, and could produce photoprints of the same hue irrespective of the type of a printer.

Example 5

Multilayer color photographic light-sensitive materials (Sample Nos. 121 to 130) were prepared in the same manner as in the preparation of Sample No. 101, except that the magenta coupler in the 6th and 7th layers (M-I-4) and the high-boiling solvent (Oil-2) were replaced by those shown in Table 7.

The so-obtained samples were evaluated in the same manner as in Example 3, and the results obtained are summarized in Table 8.

Table 7

Sample	Magenta coupler in 6th layer				Magenta coupler in 7th layer				High boiling point solvent			
	Compound		Amt. *		Compound		Amt. *		6th layer		7th layer	
	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *
101	M-I-4	0.50	-	-	M-I-4	0.25	-	-	Oil-2	0.70	Oil-2	0.35
121	M-I-4	0.50	M-II-19	0.40	M-I-4	0.25	M-II-19	0.20	A-17	0.70	A-17	0.35
122	M-I-4	0.50	M-II-19	0.40	M-I-4	0.25	M-II-19	0.20	A-21	0.70	A-21	0.35
123	M-I-4	0.50	M-II-26	0.45	M-I-4	0.25	M-II-26	0.20	A-17	0.70	A-17	0.35
124	M-I-4	0.50	M-II-34	0.45	M-I-4	0.25	M-II-34	0.20	A-16	0.70	A-17	0.35
125	M-I-10	0.60	M-II-19	0.50	M-I-10	0.30	M-II-19	0.30	A-17	0.70	A-17	0.35
126	M-I-10	0.60	M-II-26	0.50	M-I-10	0.30	M-II-26	0.30	A-16	0.70	A-16	0.35
127	M-I-10	0.60	M-II-34	0.50	M-I-4	0.25	M-II-34	0.25	A-21	0.70	A-21	0.35
128	M-I-44	0.80	M-II-19	0.50	M-I-44	0.42	M-II-19	0.35	A-17	0.70	A-17	0.35
129	M-I-44	0.80	M-II-26	0.50	M-I-44	0.42	M-II-26	0.35	A-21	0.70	A-17	0.35
130	M-I-44	0.80	M-II-19	0.50	M-I-4	0.25	M-II-34	0.20	A-33	0.70	A-33	0.35

* Each amount is indicated by g/lm²

Table 8

Sample	Preservability		Gradation	Hue Change
	Δ Fog	Relative Speed	Variation	
101	0.18	74	35	D
121	0.14	84	9	A
122	0.13	84	10	A
123	0.13	83	10	B
124	0.14	82	11	B
125	0.14	82	13	A
126	0.13	83	12	A
127	0.14	84	13	B
128	0.13	84	15	B
129	0.12	82	14	B
130	0.14	85	11	A

Degree of change in hue caused by a change in the type of a printer:

A: Very small B: Small C: Large D: Very large

As is evident from the results, the sample No. 101 was fogged and desensitized when left at deteriorating conditions, and its photographic properties were varied considerably with a change in processing conditions as well as a change in the type of a printer.

The samples (Nos. 121 to 130) were excellent in preservability and processing stability, and could produce photoprints of the same hue irrespective of the type of a printer.

Example 6

In the following examples, the amounts of ingredients are those per square meter of a light-sensitive material, unless otherwise indicated. The amounts of a silver halide and colloidal silver are each indicated as the amount of silver, and the amounts of sensitizing dyes and couplers are those per mole of the silver in each layer.

On a cellulose triacetate film support, layers of the following compositions were provided in sequence from the support to prepare a multi-layered color photographic light sensitive material Sample 201.

First layer; Anti-halation layer (HC)

A gelatin layer containing black colloidal silver.

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Dry thickness 3 μ m

2nd layer: Intermediate layer (IL)

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Gelatin layer containing an emulsified dispersion of 2,5-di-t-octylhydroquinon.

Dry thickness 1.0 μ m

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3rd layer: Low-speed red-sensitive emulsion layer (RL)

Monodispersed emulsion of AgBrI containing 3 mol% of silver iodide having an average particle size of 0.3 μ m.

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(Emulsion I: grain size dispersion 12%) 1.8g

Sensitizing dye I 6.0 x 10⁻⁴ mol

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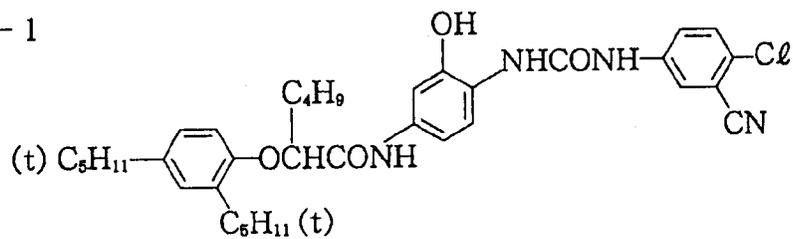
	Sensitizing dye II	1.0 x 10 ⁻⁴ mol
5	Cyan coupler (C-1)	0.06 mol
	Colored cyan coupler (CC-1)	0.003 mol
	DIR compound (D-1)	0.0015 mol
10	DIR compound (D-2)	0.002 mol
	Diethylphthalate	0.6 g
	Dry thickness	3.5 μm
15	4th layer: High-speed red-sensitive emulsion layer (RH)	
	Monodispersed emulsion of AgBrI containing 3 mol% of	
20	silver iodide having an average particle size of 0.5 μm.	
	(Emulsion II: grain size dispersion 12%)	1.3 g
	Sensitizing dye I	3.0 x 10 ⁻⁴ mol
25	Sensitizing dye II	1.0 x 10 ⁻⁴ mol
	Cyan coupler (C-1)	0.02 mol
	Colored cyan coupler (CC-1)	0.0015 mol
30	DIR compound (D-2)	0.001 mol
	Diethylphthalate	0.2 g
35	Dry thickness	2.5 μm
	5th layer: Intermediate layer (IL)	
	Gelatin layer same as the second layer.	
40	Dry thickness	1.0 μm.
	6th layer: Low-speed green-sensitive emulsion layer (GL)	
45	Emulsion I	1.2 g
	Sensitizing dye III	2.5 x 10 ⁻⁴ mol
	Sensitizing dye IV	1.2 x 10 ⁻⁴ mol
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	Magenta coupler (M-I-4)	0.07 mol
5	Colored magenta coupler (CM-1)	0.009 mol
	DIR compound (D-1)	0.0010 mol
	DIR compound (D-3)	0.0030 mol
10	Tricresyldiphosphate	0.5 g
	Dry thickness	3.5 μm
	7th layer: High speed green sensitive silver halide emulsion	
15	layer (GH)	
	Emulsion II	1.3 g
20	Sensitizing dye III	1.5×10^{-4} mol
	Sensitizing dye IV	1.0×10^{-4} mol
	Magenta coupler (M-I-4)	0.020 mol
25	Colored magenta coupler (CM-1)	0.002mol
	DIR compound (D-3)	0.0010 mol
	Tricresyldiphosphate	0.3 g
30	Dry thickness	2.5 μm
	Gelatin layer containing yellow colloidal silver and an	
35	emulsified dispersion of 2,5-di-t-octylhydroquinone	
	Dry thickness	1.2 μm
	9th layer: Low-speed blue-sensitive emulsion layer (BL)	
40	Monodispersed emulsion of AgBrI containing 3 mol% of	
	silver iodide having an average particle size of 0.48 μm .	
	(Emulsion III: grain size dispersion 12%)	
45		0.9 g
	Sensitizing dye V	1.3×10^{-4} mol
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	Yellow coupler (Y-1)	0.29 mol
	Tricresylphosphate	0.5 g
5	Dry thickness	3.5 μm
	10th layer: High-speed blue-sensitive emulsion layer (BH)	
10	Monodispersed emulsion of AgBrI containing 3 mol% of silver iodide having an average particle size of 0.8 μm . (Emulsion IV: grain size dispersion 12%)	
		0.5 g
15	Sensitizing dye V	1.0×10^{-4} mol
	Yellow coupler (Y-1)	0.08 mol
	DIR Compound (D-2)	0.0015 mol
20	Tricresylphosphate	0.10 g
	Dry thickness	2.5 μm
25	11th layer: 1st. protective layer (PRO-1)	
	Gelatin layer containing silver iodobromide emulsion (AgI 2 mol %, average grain size: 0.07 μmm) 0.3 g and UV absorber UV-1 and UV-2.	
30	Dry thickness	2.0 μm
35	12th layer: 2nd protective layer (PRO-2)	
	Gelatin layer containing polymethyl methacrylate (average particle size: 1.5 μm) and formalin scavenger HS-1 and HS-21.	
40	Dry thickness	1.5 μm
45	Gelatin hardeners H-1, H-2 and surfactant were further added to the each layer.	
	Sensitizing dye I	Anhydro-5,5'-dichloro-9-ethyl-3,3'-di-(3-sulfopropyl)thiacarbocyaninehydroxide
	Sensitizing dye II	Anhydro-9-ethyl-3,3'-di-(3-sulfopropyl)-4,5,4',5'-dibenzothiacarbocyanine-hydroxide
	Sensitizing dye III	Anhydro-5,5'-diphenyl-9-ethyl-3,3'-di-(3-sulfopropyl)oxacarbocyaninehydroxide
	Sensitizing dye IV	Anhydro-9-ethyl-3,3'-di-(3-sulfopropyl)-5,6,5'6'-dibenzothiacarbocyanine-hydroxide
50	Sensitizing dye V	Anhydro-3,3'-di-(3-sulfopropyl)-4,5-benzo-5'-methoxythiacyaninehydroxide

C - 1

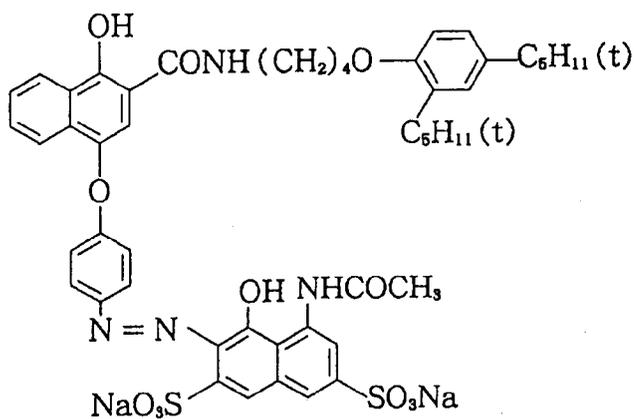
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CC - 1

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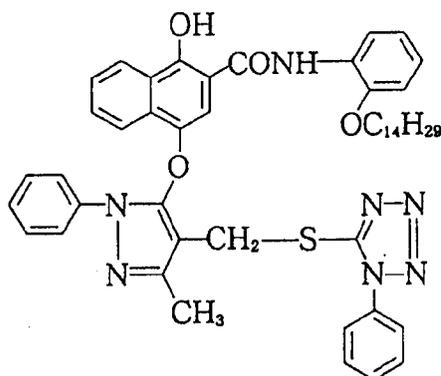


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D - 1

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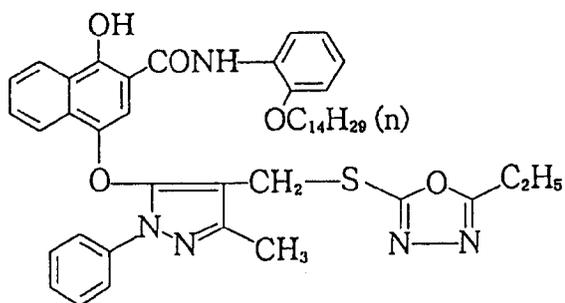


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D - 2

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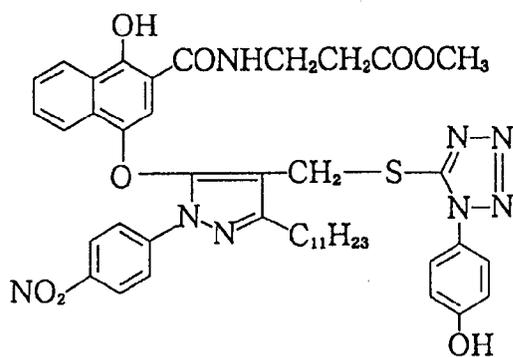
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D-3

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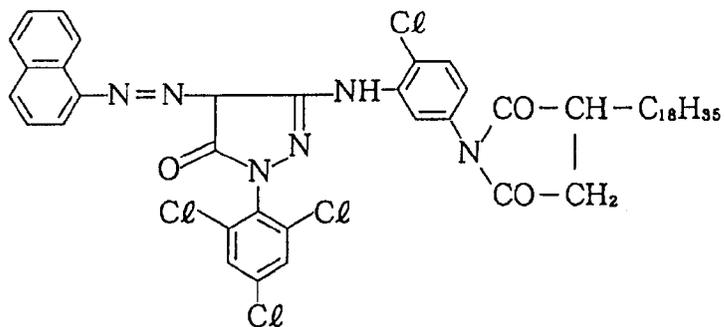


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CM-1

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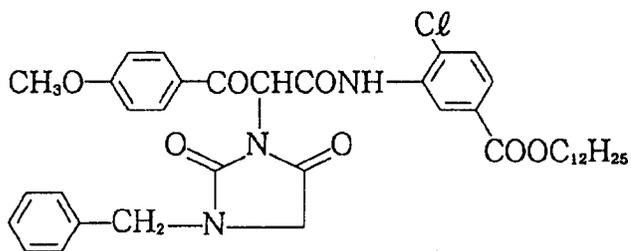
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Y-1

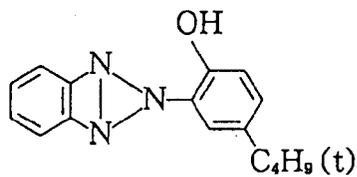
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UV-1

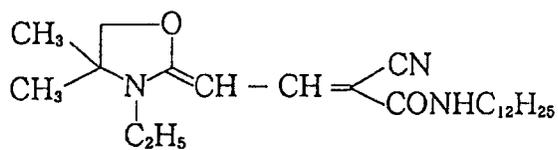
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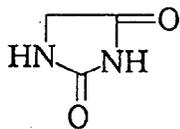
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UV-2

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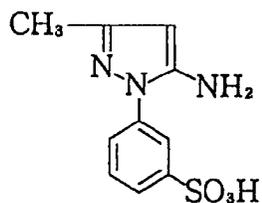


HS - 1



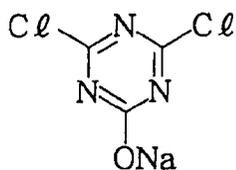
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HS-21



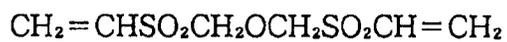
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H - 1



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H - 2



Sample Nos. 202 to 217 were prepared in the same manner as in the preparation of Sample No. 201, except that the magenta couplers in the 6th and 7th layers (M-I-4) were replaced by those shown in Tables 9 and 10, and that the Compound [A-II] was added as shown in Tables 9 and 10.

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Table 9

Sample	Magenta coupler in 6th layer				Magenta coupler in 7th layer				High boiling point solvent			
	Compound		Amt. *		Compound		Amt. *		Compound		Amt. *	
	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *
101	M-I-4	0.07	-	-	M-I-4	0.02	-	-	-	-	-	-
102	M-I-4	0.07	-	-	M-I-4	0.02	-	-	A-238	0.3	A-238	0.2
103	M-I-4	0.06	M-II-1	0.04	M-I-4	0.015	M-II-1	0.015	-	-	-	-
104	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-1	0.015	-	-	-	-
105	M-I-4	0.06	M-II-1	0.04	M-I-4	0.015	M-II-1	0.015	A-238	0.3	A-238	0.2
106	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-19	0.015	A-238	0.3	A-238	0.2
107	M-I-4	0.06	M-II-23	0.04	M-I-4	0.015	M-II-23	0.015	A-238	0.3	A-238	0.2
108	M-I-4	0.06	M-II-26	0.04	M-I-4	0.015	M-II-26	0.015	A-238	0.3	A-238	0.2
109	M-I-2	0.06	M-II-19	0.04	M-I-2	0.015	M-II-19	0.015	A-238	0.3	A-238	0.2
110	M-I-29	0.06	M-II-19	0.04	M-I-29	0.015	M-II-19	0.015	A-238	0.3	A-238	0.2
111	M-I-43	0.06	M-II-19	0.04	M-I-43	0.015	M-II-19	0.015	A-238	0.3	A-238	0.2

* Each amount is indicated by g/lm²

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Table 10

Sample	Magenta coupler in 6th layer				Magenta coupler in 7th layer				Compound [A-II]			
	Compound		Amt. *		Compound		Amt. *		6th layer	7th layer		
	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *	Compound	Amt. *		
211	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-19	0.015	A-201	0.3	A-201	0.2
212	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-19	0.015	A-227	0.3	A-227	0.2
213	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-19	0.015	A-229	0.3	A-229	0.2
214	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-19	0.015	A-233	0.3	A-233	0.2
215	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-19	0.015	A-239	0.3	A-239	0.2
216	M-I-4	0.06	M-II-19	0.04	M-I-4	0.015	M-II-19	0.015	A-240	0.3	A-240	0.2

* The amounts of the magenta coupler in 6th and 7th layer are indicated by mol per 1 mol of silver in respective layer.
The amounts of the compound [A-II] are indicated by g/lm².

55 Each resulted sample was exposed wedgewize in a conventional manner, and processed according to the Example 3.

[Evaluation for Sensitivity]

5 Sensitometry was measured by green light for each processed samples. The sensitivity was evaluated with a reciprocal value of exposure necessary to give density of fog value plus 0.3, and the sensitivity of samples 201 to 217 are shown in Table 4 in the relative value regarding that the sensitivity of sample 201 is 100.

[Evaluation for Preservability]

10 Sample Nos. 201 to 217 were left at 40°C and RH80% for 7 days for forced deterioration, exposed to white light through a step wedge (specifically designed for sensitometry) and processed in the same way as mentioned above. For each of the deteriorated samples, the fogging density and sensitivity of the green-sensitive layer were measured. An increase in fogging density Δ Fog after the forced deterioration was obtained. Sensitivity was expressed as a value relative to that before the forced deterioration which was taken as 100.

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[Influence of Change in Type of Printer on Hue]

20 Sample Nos. 201 to 217 were exposed to white light equally, and processed in the same way as mentioned above, except that the pH of the developer was varied to 10.18. Each of the processed samples was printed on color paper by means of printer A in such a manner that gray with a reflectance density of 0.5 was formed, whereby photoprints 201A to 217A were obtained.

25 Next, the similar test was performed wherein the printer A was replaced with the printer B having a different detector characteristics at the region of green area, and the printed samples 201B to 217B were obtained to detect the variation of hue depending on the printers. Degree of hue variation inter printer was evaluated visually by ten panelers. The results are all shown in Table 11.

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Table 11

5	Sample	Sensi- tivity	<u>Preservability</u>		<u>Hue variation inter printer</u>
			<u>ΔFog</u>	<u>Relative Sensitivity</u>	
	201	100	0.17	77	D
10	202	117	0.15	91	C
	203	91	0.10	81	B
	204	92	0.10	80	B
15	205	113	0.11	90	A
	206	115	0.11	90	A
20	207	112	0.11	91	A
	208	111	0.10	91	A
	209	113	0.11	92	A
25	210	113	0.10	92	A
	211	111	0.11	90	A
30	212	105	0.10	86	A
	213	104	0.10	85	A
	214	104	0.10	86	A
35	215	113	0.12	90	A
	216	114	0.11	91	A
40	217	103	0.10	84	A

A: Very small B: Small C: Large D: Very large

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As is evident from the results in Table 11, the Samples 205 to 217 has reduced fog and desensitization when left at forced deteriorating conditions, and its photographic properties were improved considerably with a change in processing conditions as well as a change in the type of a printer.

Further samples 205 to 211, 215 and 216, which contains more preferable compounds out of the Compound of [A-II] has much higher sensitivity and desensitization when left at forced deteriorating conditions remarkably.

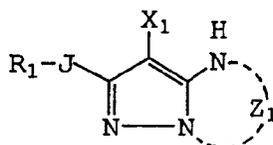
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Claims

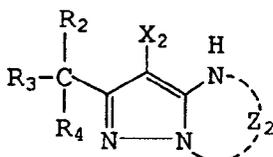
- 55 1. A silver halide color photographic light-sensitive material comprising a support and provided thereon photographic component layers including blue-sensitive silver halide emulsion layers, green-sensitive silver halide emulsion layers and red-sensitive silver halide emulsion layers, wherein at least one of said green-sensitive silver halide emulsion layers contains at least one magenta coupler represented by formula M-

I, at least one magenta coupler represented by formula M-II:

Formula M-I



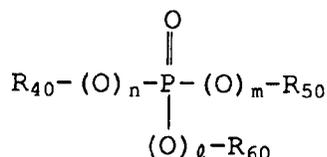
Formula M-II



wherein R_1 is a hydrogen atom, an alkyl group or an aryl group; R_2 , R_3 and R_4 each represent a hydrogen atom, an alkyl group or an aryl group, and may combine with each other to form a saturated or unsaturated ring, provided that at least two of R_2 , R_3 and R_4 are not hydrogen atoms; J represents a methylene group, an oxygen atom or a sulfur atom; X_1 and X_2 each represent a hydrogen atom or a group capable of being released by a reaction with an oxidized color developing agent; and Z_1 and Z_2 each represent a group of non-metallic atoms necessary for forming a nitrogen-containing heterocyclic ring which may have a substituent.

2. A silver halide color photographic light-sensitive material of claim 1, wherein said green-sensitive silver halide emulsion layers further contains at least one compound represented by formula I:

Formula I

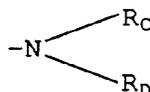


wherein R_{40} , R_{50} and R_{60} each represent an alicyclic group or an aromatic group; and 1, m and n each represent 0 or 1, provided that at least one of them is 0.

3. A silver halide color photographic light-sensitive material of claim 1, wherein said green-sensitive silver halide emulsion layers further contains at least one and at least one compound represented by formula II:



wherein R_A and R_B , whether identical or different, each represent a hydrogen atom, an alkyl group, a cycloalkyl group, an alkenyl group, a cycloalkenyl group, an alkinyl group, an aryl group, a heterocyclic group, an alkoxy group, an aryloxy group, a heterocyclic oxy group or



wherein R_C and R_D each represent a hydrogen atom, an alkyl group or an aryl group.

4. A silver halide color photographic light-sensitive material of claim 1, wherein said green-sensitive silver

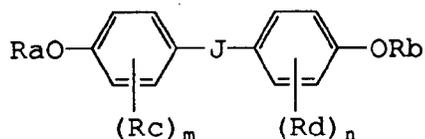
halide emulsion layers further contains at least one and at least one compound represented by formula A-I:



wherein J represents a divalent organic group; Y represents an alkyl group, a cycloalkyl group, an aryl group, an alkenyl group, an alkinyl group, a cycloalkenyl group or a heterocyclic group.

5. A silver halide color photographic light-sensitive material of claim 1, wherein said green-sensitive silver halide emulsion layers further contains at least one and at least one compound represented by formula A-I:

Formula A-II



wherein R_a and R_b each represent a hydrogen atom, an alkyl group, a cycloalkyl group, an alkenyl group or an aryl group; R_c and R_d each represent a halogen atom, an alkyl group, a cycloalkyl group, an alkenyl group, an alkoxy group, an aryl group, an aryloxy group, an alkylthio group, an arylthio group, an acyl group, an acylamino group, a sulfonyl group, a sulfonamide group or a hydroxy group; m and n each represent an integer of 0 to 4, when m is an integer of 2 to 4, R_c s may be either identical with or different from each other, and when n is an integer of 2 to 4, R_d s may be either identical with or different from each other; and J represents a divalent bonding group.



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 92 30 4489

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 192 199 (KONISHIROKU) * page 109, line 15 - line 25; claims 6,7 * ---	1-5	G03C7/30
A	EP-A-0 286 431 (KONICA CORP.) * claims * ---	1,2	
A	EP-A-0 422 595 (KONICA CORP.) * claims * ---	1,4	
P,A	EP-A-0 457 543 (KONICA CORP.) * claims * -----	1,5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G03C
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 03 SEPTEMBER 1992	Examiner STOCK H.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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