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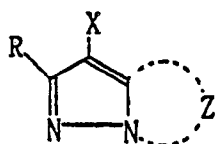
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54 **A silver halide color photographic light-sensitive material for making color negatives.**

57 A silver halide color photographic light-sensitive material for making color negatives is disclosed. The color photographic material comprises a support having thereon a blue-sensitive silver halide emulsion layer, a green-sensitive silver halide emulsion layer and a red-sensitive silver halide emulsion layer, and the green-sensitive emulsion layer is comprised of a single layer containing a DIR compound and a magenta coupler represented by the following Formula 1:



(I)

wherein Z represents a group of nonmetallic atoms necessary to form a nitrogen-containing heterocyclic ring, provided that the ring formed by Z may have a substituent: X is a hydrogen atom or a substituent capable of being split off upon reaction with the oxidation product of a color developing agent; and R is a hydrogen atom or a substituent. The photographic material is excellent in the image sharpness, processing stability and preservability as well as in the formalin resistance.

A SILVER HALIDE COLOR PHOTOGRAPHIC LIGHT-SENSITIVE MATERIAL FOR MAKING COLOR NEGATIVES

FIELD OF THE INVENTION

The present invention relates to a silver halide color photographic light-sensitive material for making color negatives, and more particularly to improvements in the characteristics comprising the sharpness, processing stability, preservability and formalin resistance of a silver halide color photographic light-sensitive material.

BACKGROUND OF THE INVENTION

In present-day color photography, making color prints by enlarging color negatives onto color papers, i.e., the so-called negative-positive process, is prevailing. One reason for this is that a color negative film has a latitude wide enough to minimize the probability of failure in exposure, thus enabling even unskilled users to easily shoot to make color photographs. This, unlike reversal-type color films, is a significant advantage for the negative-positive system. It is important for the color negative film to have a wide latitude as well as improved graininess and sharpness.

In conventional negative films for camera-exposure use, it is considered that reducing the average grain size of silver halide grains is effective in improving the graininess and making the overall photographic component layers thinner is effective in improving the sharpness. Actually, any of those new light-sensitive material products in recent years have their graininess and sharpness improved by the above-mentioned means.

A presently commercially available color negative film for camera-exposure use is of a multilayer construction comprising blue, green and red-sensitive emulsion layers, each of which layers is comprised of a plurality of high and low-speed layers, in combination with various additives and auxiliary layers to obtain a wide latitude and excellent graininess and sharpness. As a result of our investigation, however, even a standard light-sensitive material of the ISO speed 100 type leaves no more room for a large improvement in the graininess by reducing the silver halide grain size even if such a multi-layer construction is further tried, and besides, it is very difficult to retain the sharpness and other important photographic characteristics, in the practicable range.

Accordingly, back to the starting point of the art of light-sensitive materials, we investigated a light-sensitive material having a color-sensitive layer consisting of a single layer. It has now been found, however, that although the sharpness and processing stability are surely improved by the construction comprising a single layer, the magenta dye's formalin resistance is poor and the preservability of the light-sensitive material before being exposed is still insufficient.

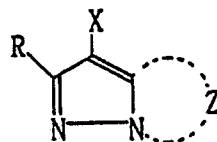
On the other hand, pyrazoloazole-type magenta couplers such as pyrazolopyrazole, pyrazolotriazole, etc., are known to be excellent in the formalin resistance, but the fact that they are capable of improving the preservability of a light-sensitive material before being exposed have not yet been known at all.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a silver halide color photographic light-sensitive material for making color negatives which is excellent in the sharpness, processing stability and preservability as well as in the formalin resistance.

The above object of the invention can be accomplished by a silver halide color photographic light-sensitive material for making color negatives comprising a support having thereon at least a blue-sensitive silver halide emulsion layer, a green-sensitive silver halide emulsion layer, a red-sensitive silver halide emulsion layer, in which the green-sensitive emulsion layer is comprised of a single layer containing a DIR coupler and a magenta coupler represented by the following Formula I:

Formula I



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wherein Z represents a group of nonmetallic atoms necessary to form a nitrogen-containing heterocyclic ring, provided that the ring formed by Z may have a substituent; X is a hydrogen atom or a group capable of being split off upon the reaction with the oxidation product of a color developing agent; and R is a hydrogen atom or a substituent.

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DETAILED DESCRIPTION OF THE INVENTION

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In the present invention, a single layer mentioned above includes also a plurality of emulsion layers provided as serial layers which are equal in the type of the coupler contained therein, the silver halide grain size, the silver halide composition and crystal habit, and the ratio of the coupler to the silver halide.

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In the invention, preferably, each of the green-sensitive and blue-sensitive silver halide emulsion layers is of a single layer, and more preferably, each of the green-sensitive, blue-sensitive and red-sensitive silver halide emulsion layers is of a single layer.

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When the same color sensitivity-having layers are of a single-layer construction the number of coating layers of a light-sensitive material is reduced compared to the conventional multilayer construction to thus enable to make the layer thinner. Accordingly, the sharpness and graininess as well as the production efficiency of the light-sensitive material can be improved. The total dry thickness of the layers is preferably 20 to 3 μ m, and more preferably 15 to 5 μ m.

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The exposure latitude of the silver halide emulsion layer being a single layer is preferably not less than 3.0. A useful means to widen the latitude to this extent is a method of using mixed silver halide grains different in the sensitivity. The method includes, for example, a method of using mixed silver halide emulsions different in the average grain size, and a method of incorporating a desensitizer into at least a part of silver halide grains.

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The silver halide emulsions different in the average grain size to be mixed in order to obtain a wide latitude are preferably a combination of a silver halide emulsion having the largest average grain size of 0.2 to 2.0 μ m and a silver halide emulsion having the smallest average grain size of 0.05 to 1.0 μ m, and further one or more kind of silver halide emulsion having a medium average grain size may also be used in combination.

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The average grain size of the silver halide emulsion having the largest average grain size is preferably 1.5 to 40 times that of the silver halide grains having the smallest average grain size.

As the desensitizer mentioned above, besides metallic ions, various agents including antifoggants, stabilizers, desensitizing dyes and the like may be used. Above all, a metallic ion doping method is preferred.

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The metallic ion to be used in the doping includes metallic ions such as of Cu, Cd, Zn, Pb, Fe, Ti, Rh, Bi, Ir, Au, Os, Pd, etc. Preferred among these are Cu, Rh and Os, and the most preferred is Rh. These metallic ions may be used in the form of, e.g., halogeno complex salts, and also in combination of two or more of them. pH of the AgX suspension in doping is preferably not more than 5.

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The doping amount of these metallic ions depends on the kind of a metallic ion, the silver halide grain size, the doping position of a metallic ion, the objective sensitivity etc., but is preferably 10⁻¹⁷ to 10⁻² mole per mole of AgX, and particularly 10⁻¹⁶ to 10⁻⁴.

Further, by selecting the kind of a metallic ion, a doping position and a doping amount, the silver halide grain may be given any arbitrary sensitivity.

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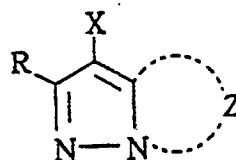
The foregoing antifoggant or stabilizer usable as a desensitizer includes azoles such as benzothiazolium salts, indazoles, triazoles, benzotriazoles and benzimidazoles; mercapto-substituted heterocyclic compounds such as mercaptotetrazoles, mercaptothiazoles, mercaptothiadiazoles, mercaptobenzothiazoles, mercaptobenzimidazoles and mercaptopyrimidines; azaindenes such as tetraazaindenes and pentaazaindenes, nucleic acid decomposition products such as adenine and guanine; benzenethiosulfonic acids; and thioketo compounds.

The foregoing desensitizing dye includes cyanine dyes, merocyanine dyes, complex cyanine dyes, complex merocyanine dyes, holopolar cyanine dyes, hemicyanine dyes, styryl dyes and hemioxonol dyes.

A position where the desensitizing dye is to be present, from the standpoint of the preservability of a light-sensitive material and the retention stability of a coating liquid, is preferably the inside of the silver halide grain, where the desensitizing dye may be contained in to be either uniformly distributed or present locally in the central or intermediate portion of the grain, or may be present so as to be gradually reduced toward outside from the central portion of the grain.

The magenta coupler represented by the foregoing Formula I is explained:

Formula I



In the above formula, Z is a group of non-metallic atoms necessary to form a nitrogen-containing heterocyclic ring. The ring formed by Z may have a substituent.

X is a hydrogen atom or a substituent capable of being split off upon the reaction with the oxidation product of a color developing agent.

R is a hydrogen atom or a substituent.

The substituent represented by R, although not particularly restricted, is typified by an alkyl group, an aryl group, an anilino group, an acylamino group, a sulfonamido group, an alkylthio group, an arylthio group, an alkenyl group and a cycloalkyl group. In addition, it is also typified by a halogen atom, a cycloalkenyl group, an alkynyl group, a heterocyclic group, a sulfonyl group, a sulfinyl group, a phosphonyl group, an acyl group, a carbamoyl group, a sulfamoyl group, a cyano 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 alkoxycarbonylamino group, an aryloxycarbonylamino group, an alkoxycarbonyl group, an aryloxycarbonyl group, a heterocyclic thio group, a spiro compound residue and a bridged hydrocarbon compound residue.

The alkyl group represented by R is preferably one having 1 to 32 carbon atoms and may be either straight-chain or branched-chain. The aryl group represented by R is preferably a phenyl group.

The acylamino group represented by R includes an alkylcarbonylamino group and an arylcarbonylamino group.

The sulfonamido group represented by R includes an alkylsulfonylamino group and an arylsulfonylamino group.

The alkyl component and aryl component of the alkylthio group and arylthio group represented by R include the above alkyl and aryl groups represented by R.

The alkenyl group represented by R includes one having 2 to 32 carbon atoms, and the cycloalkenyl group is one having 3 to 12 carbon atoms, particularly preferably to 7 carbon atoms. The alkenyl group may be either straight-chain or branched-chain.

The cycloalkenyl group represented by R includes one having preferably 3 to 12 carbon atoms, and particularly 5 to 7 carbon atoms.

The sulfonyl group represented by R includes an alkylsulfonyl group, an arylsulfonyl group.

The sulfinyl group represented by R includes an alkylsulfinyl group, an arylsulfinyl group.

The phosphonyl group includes an alkylphosphonyl group, an alkoxyphosphonyl group, an aryloxyphosphonyl group, an arylphosphonyl group.

The acyl group includes an alkylcarbonyl group, an arylcarbonyl group.

The carbamoyl group includes an alkylcarbamoyl group, an arylcarbamoyl group.

The sulfamoyl group includes an alkylsulfamoyl group, an arylsulfamoyl group.

The acyloxy group includes an alkylcarbonyloxy group, an arylcarbonyloxy group.

The carbamoyloxy group includes an alkylcarbamoyl group, an arylcarbamoyloxy group.

The ureido group includes an alkylureido group, an arylureido group.

The sulfamoylamino group includes an alkylsulfamoylamino group, an arylsulfamoylamino group.

The heterocyclic group is preferably a 5 to 7-member heterocyclic group such as a 2-furyl group, a 2-thienyl group, a 2-pyrimidinyl group, a 2-benzothiazolyl group.

The heterocyclic oxy group is preferably one having a 5 to 7-member heterocyclic ring, such as a 3,4,5,6-tetrahydropyran-2-oxy group, a 1-phenyltetrazole-5-oxy group.

The heterocyclic thio group is preferably a 5 to 7-member heterocyclic thio group, such as a 2-pyridinylthio group, a 2-benzothiazolyl group, a 2,4-diphenoxy-1,3,5-triazole-6-thio group.

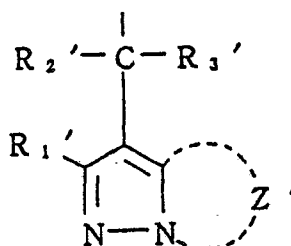
The siloxy group is preferably a trimethylsiloxy group, a triethylsiloxy group or a dimethylbutylsiloxy group.

5 The imido group is preferably a succinic acid imido group, a 3-heptadecylsuccinic acid imido group, a phthalimido group or a glutarimido group.

The spiro compound residue includes a spiro[3.3]heptane-1-yl group.

The bridged hydrocarbon compound residue includes a bicyclo[2.2.1]heptane-1-yl group, a tricyclo-[3.3.1.1^{3,7}]decane-1-yl group, a 7,7-dimethyl-bicyclo[2.2.1]heptane-1-yl group.

10 The substituent represented by X, which is capable of being split off upon the reaction with the oxidation product of a color developing agent, is, e.g., a halogen atom such as chlorine, bromine, fluorine; or an alkoxy, aryloxy, heterocyclic oxy, acyloxy, sulfonyloxy, alkoxycarbonyloxy, aryloxy-carbonyl, alkox-
 15 alkoxy, alkoxyoxalyloxy, alkylthio, arylthio, heterocyclic thio, alkoxylthiocarbonylthio, acylamino, sul-
 fonamido, nitrogen atom-bonded nitrogen-containing heterocyclic, alkoxycarbonylamino, aryloxy-car-
 bonylamino or carboxyl group or a group having the formula:



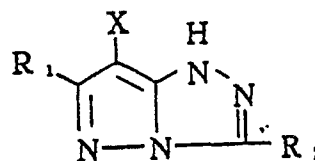
wherein R₁' is as defined for the foregoing R; Z' is as defined for the foregoing Z; R₂' and R₃' each represents a hydrogen atom, an aryl group, an alkyl group or a heterocyclic group.

Preferred among these substituents is the halogen atom, particularly a chlorine atom.

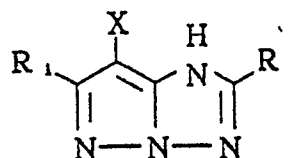
30 The nitrogen-containing heterocyclic ring represented by Z or Z' is a pyrazole ring, an imidazole ring, a triazole ring or a tetrazole ring, and the substituent which the above ring may have is as defined in the above R.

The compounds having the foregoing Formula I, to be concrete, include those compounds represented by the following Formulas II through VII:

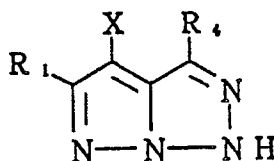
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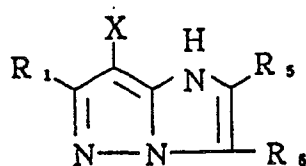
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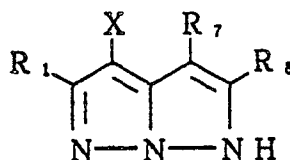
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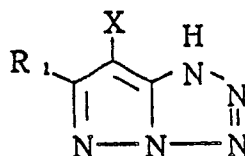
Formula V



Formula VI

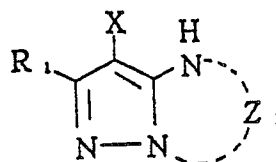


Formula VII



40 In Formulas II through VII, R₁ to R₉ and X are as defined for the foregoing R and X, respectively.
Besides, the most preferred among the compounds having Formula I are those represented by the following Formula VIII.

Formula VIII



wherein R₁, X and Z₁ are as defined for the R, X and Z, respectively, of Formula I.

55 The preferred ones among those magenta couplers represented by Formulas II through VII are the magenta couplers having Formula II.

The most preferred as the substituent represented by R or R₁ to the foregoing heterocyclic ring are those represented by the following Formula IX:

Formula IX R₉-CH₂-

wherein R_9 is as defined for the foregoing R.

A preferred one as R_9 is a hydrogen atom or an alkyl group.

The preferred groups as the substituent which may be on the ring formed by the Z in Formula I or which may be on the ring formed by the Z_1 in Formula VIII and as the R_2 through R_8 in Formulas II through VI are those represented by the following Formula X:

Formula X $-R^1-SO_2-R^2$

wherein R^1 represents an alkylene group; and R^2 represents an alkyl group, a cycloalkyl group or an aryl group.

The alkylene group represented by R^1 is a straight-chain or branched-chain one whose straight-chain portion has preferably not less than 2 carbon atoms, and more preferably 3 to 6 carbon atoms.

The cycloalkyl group represented by R^2 is preferably a 5 or 6-member cycloalkyl group.

The following are typical examples of the compounds in accordance with the invention.

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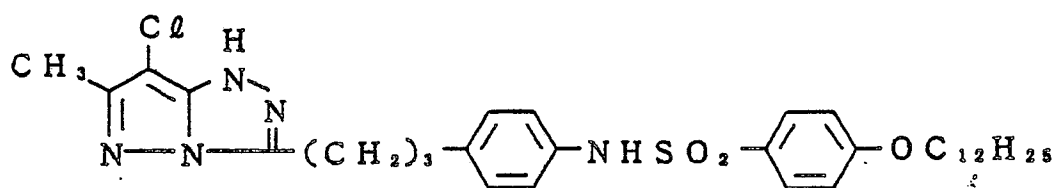
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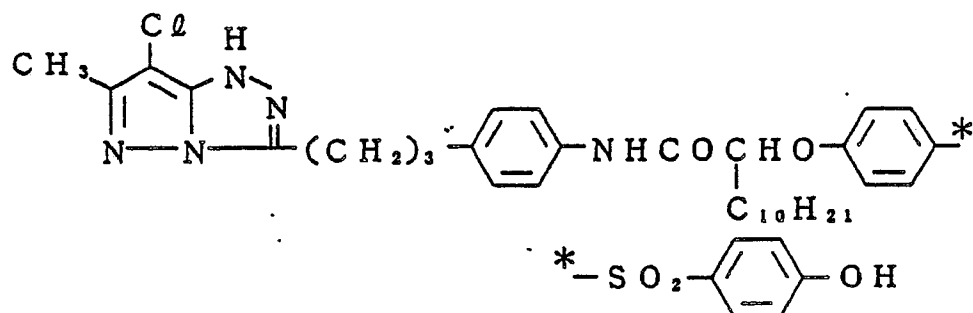
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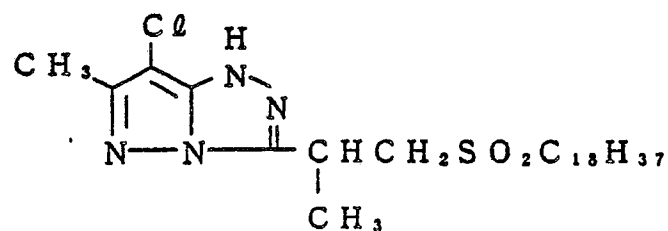
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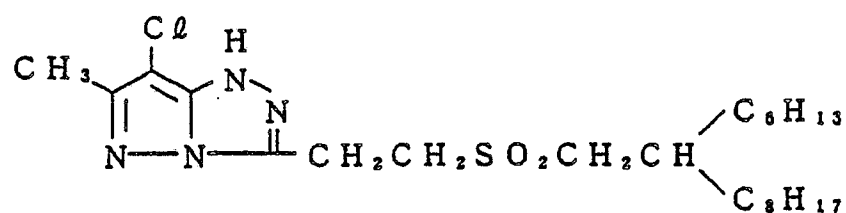
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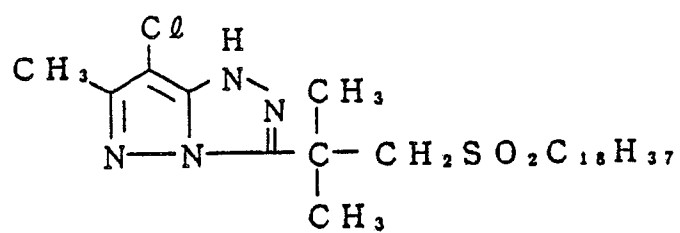


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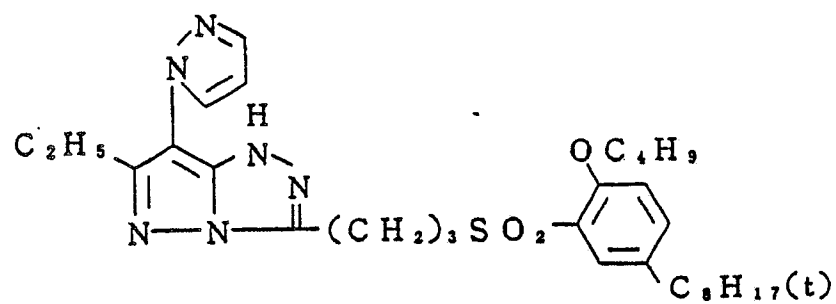
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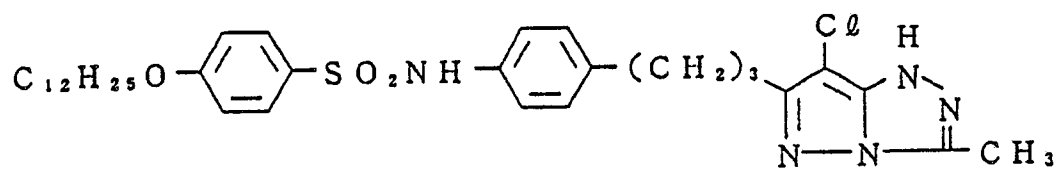


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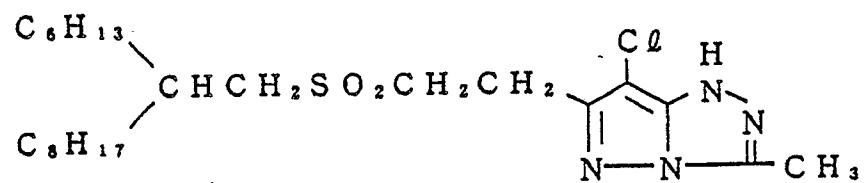
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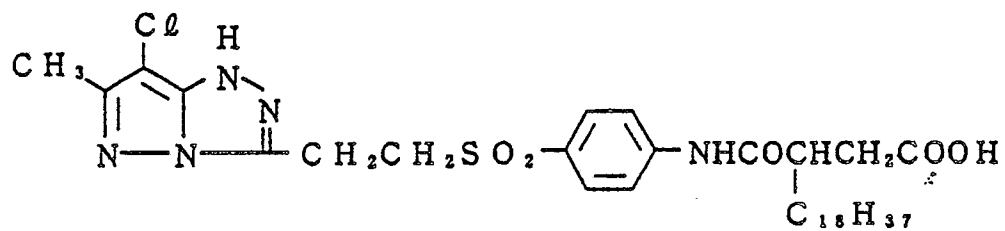


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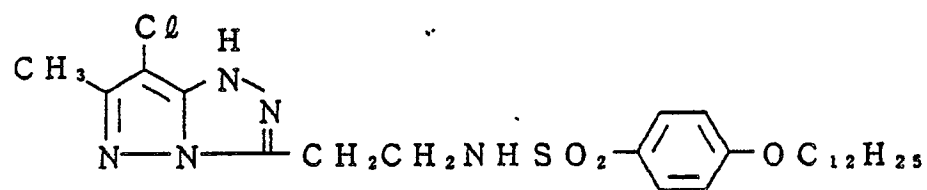
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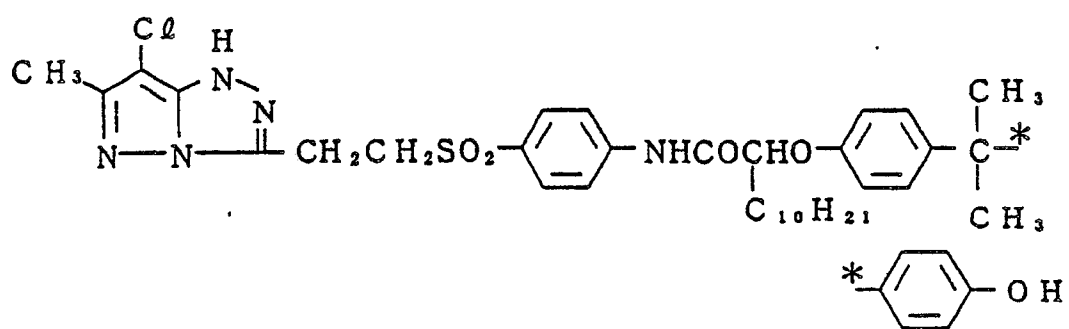
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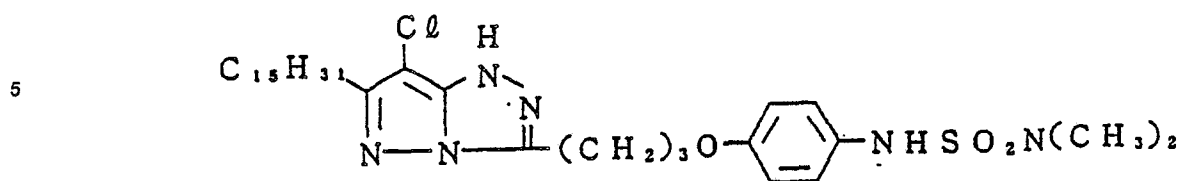
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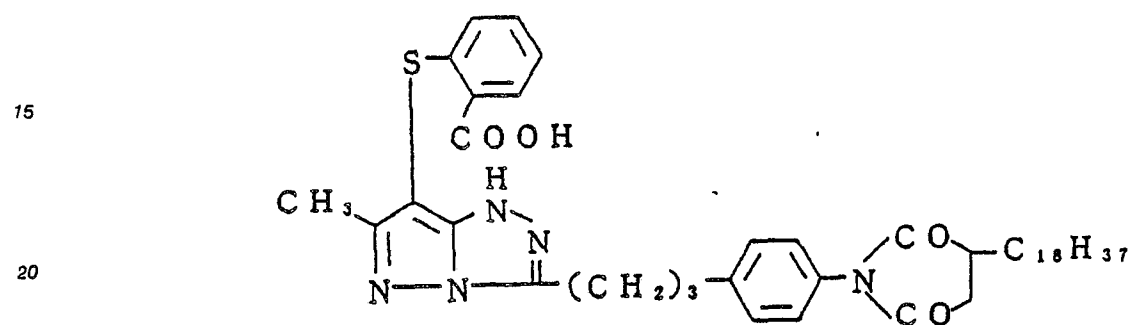
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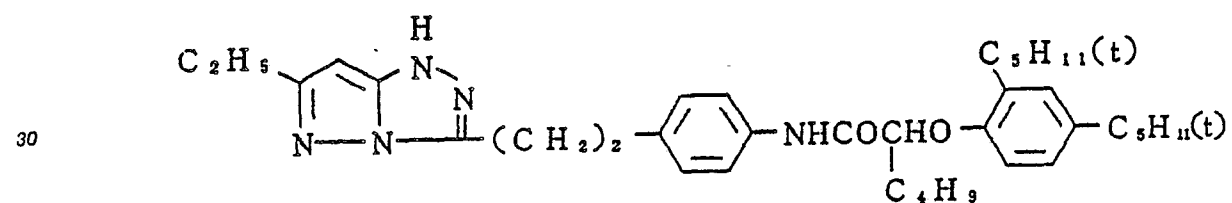
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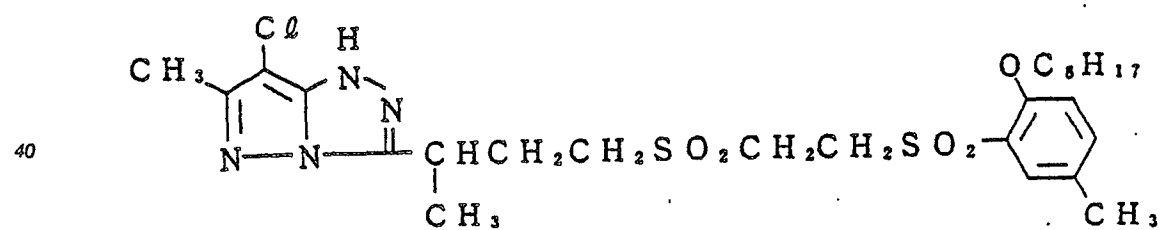
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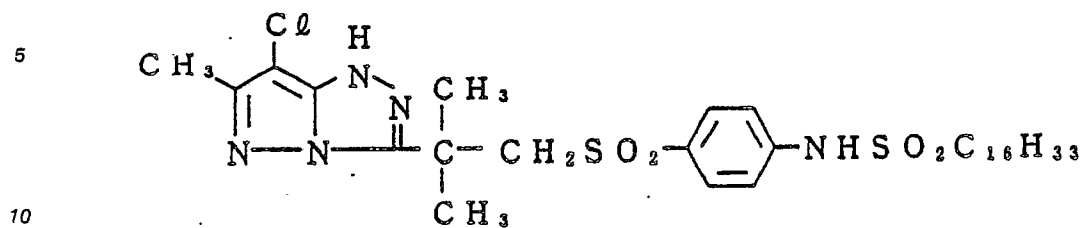


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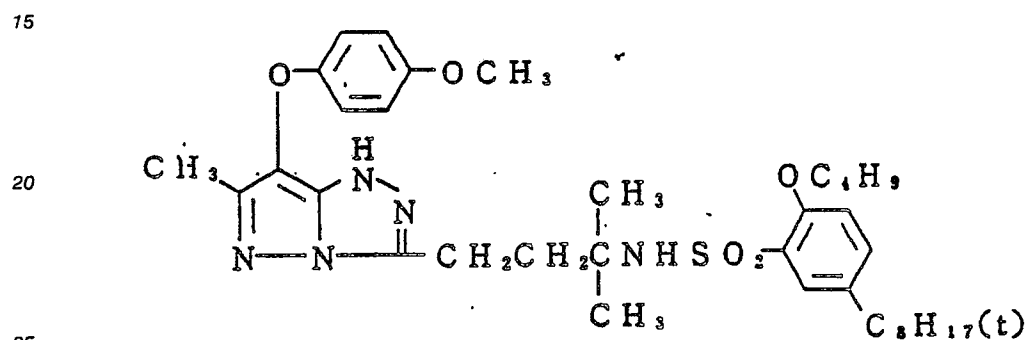


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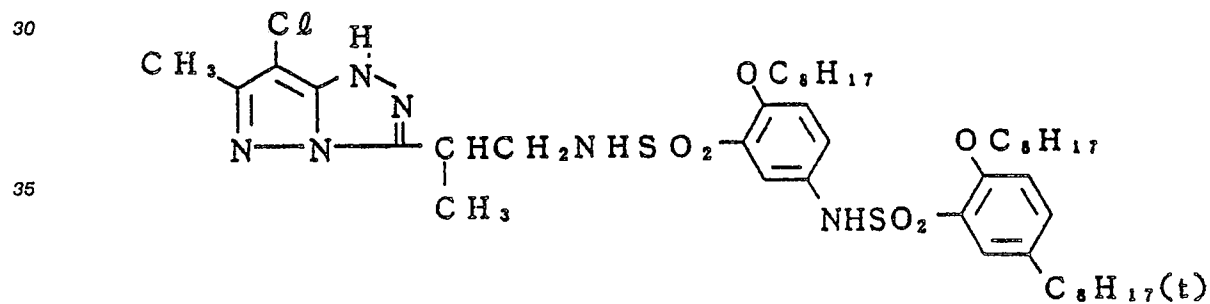
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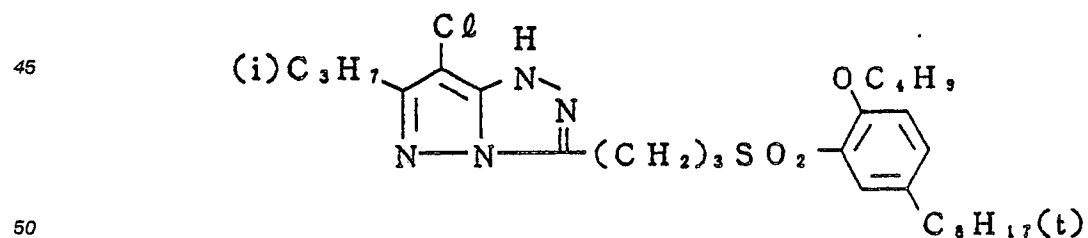
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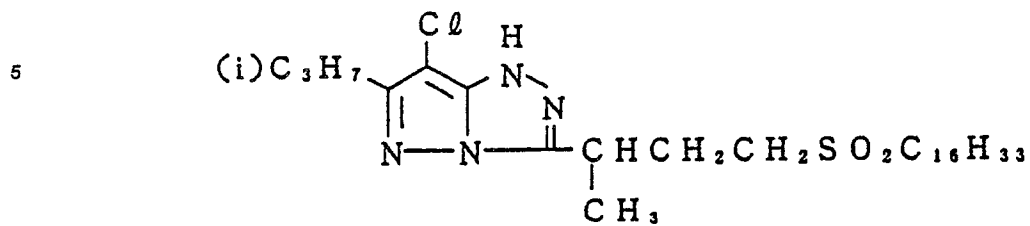


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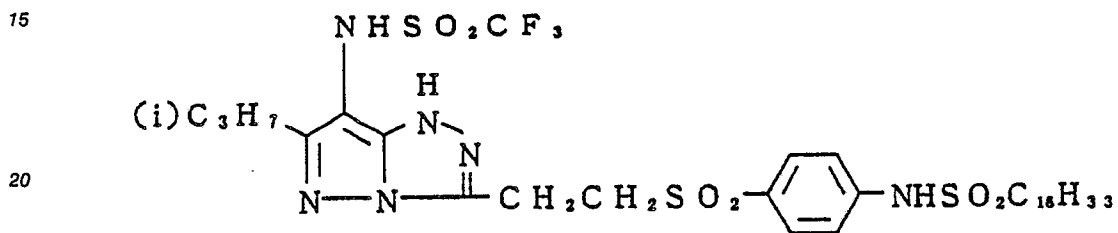


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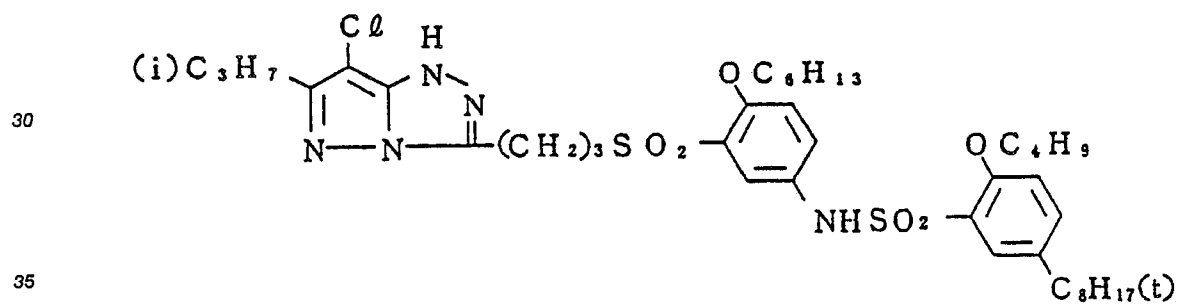
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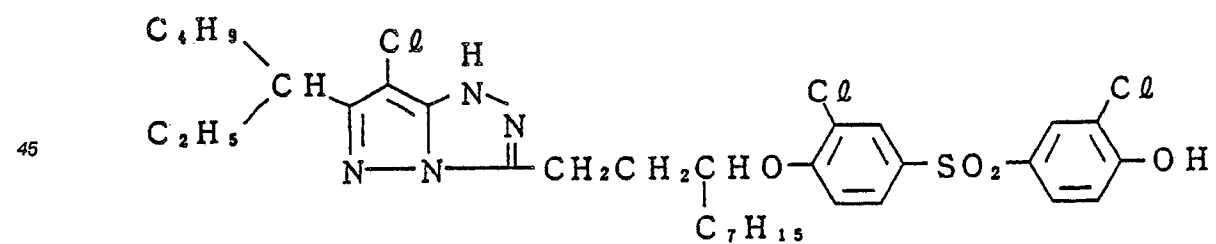
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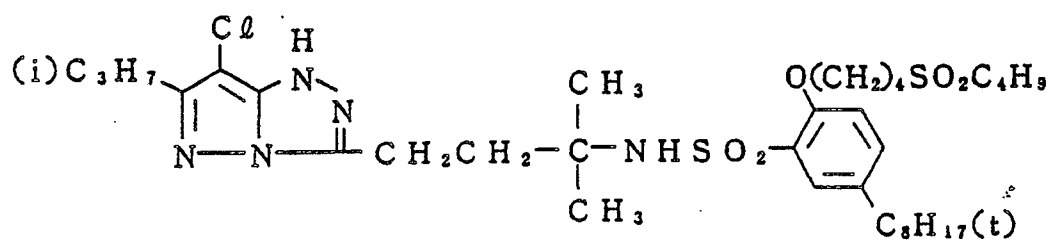
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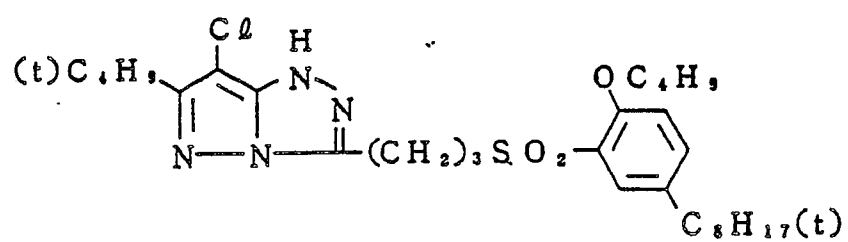
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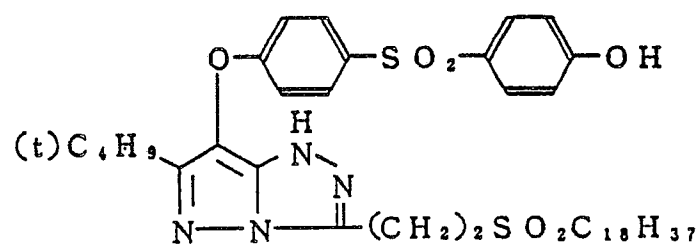
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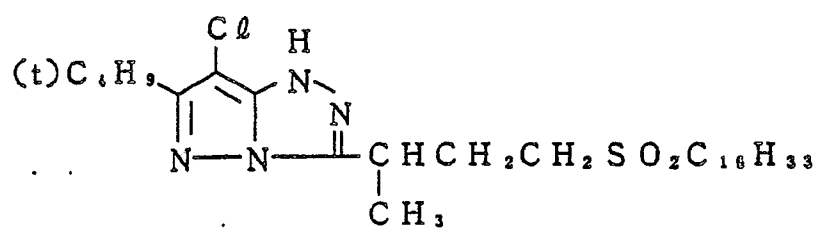
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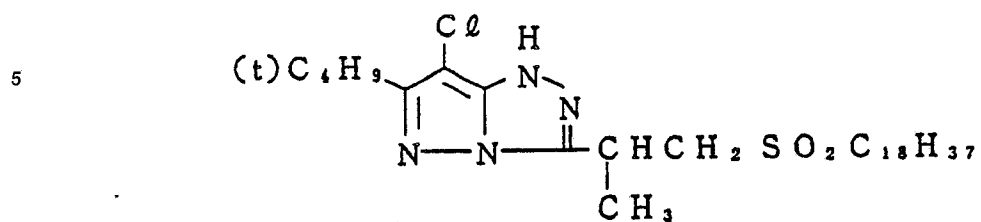
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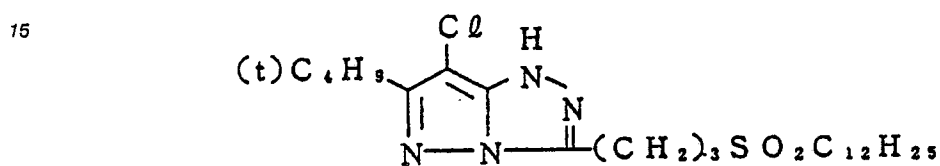
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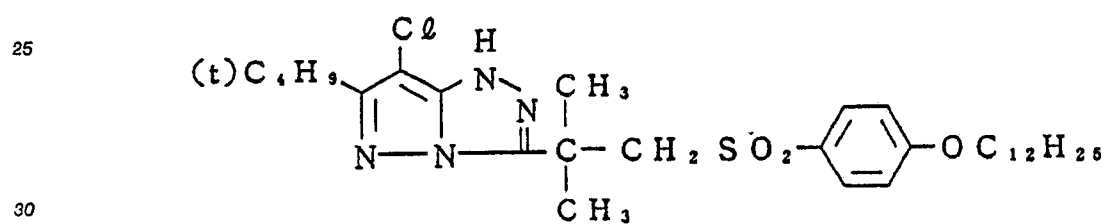
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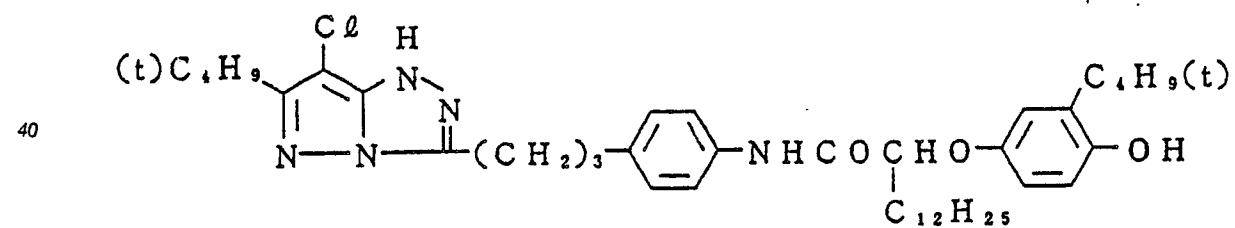
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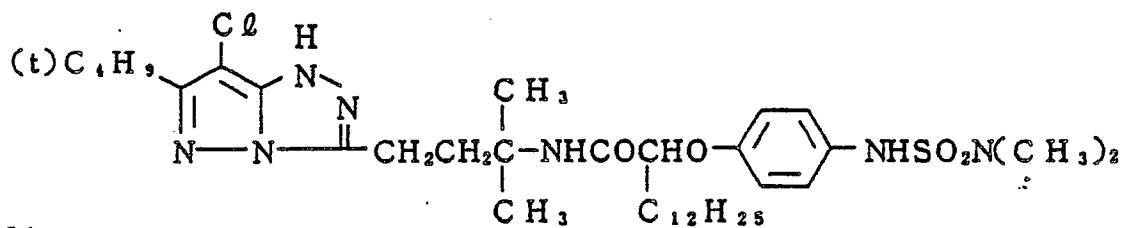
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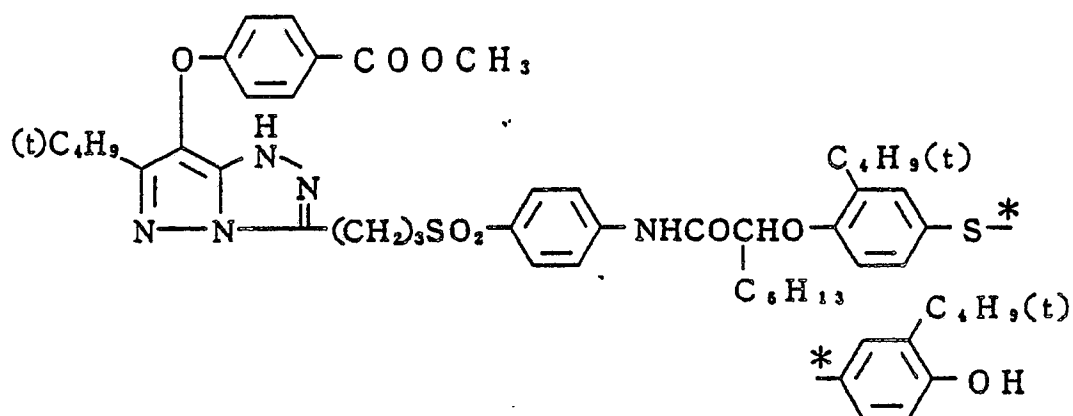
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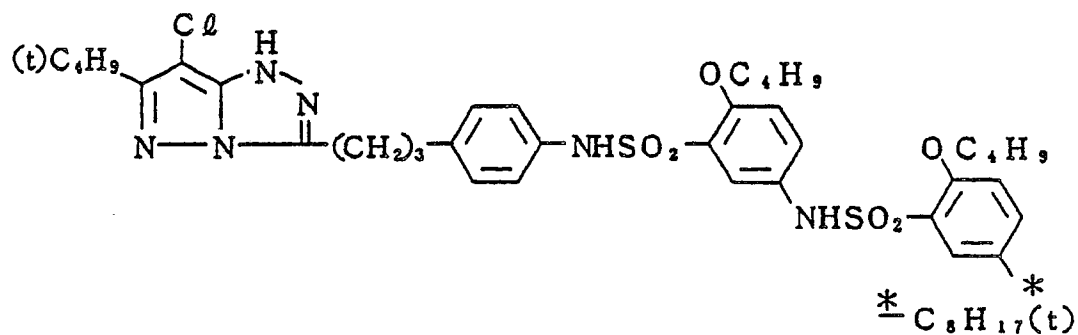
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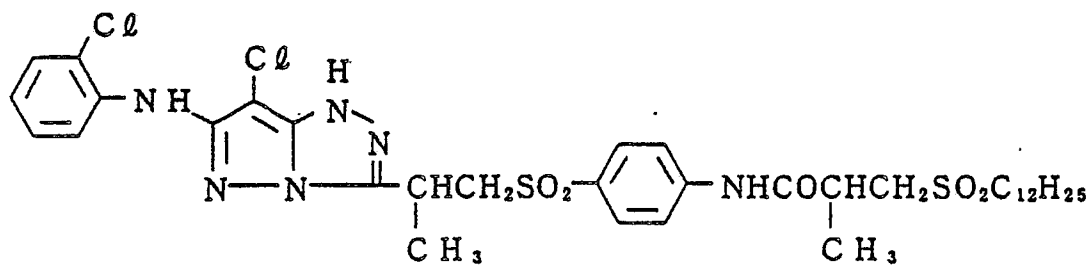
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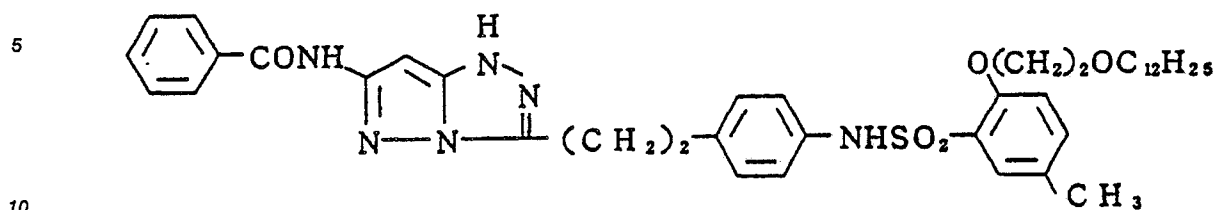
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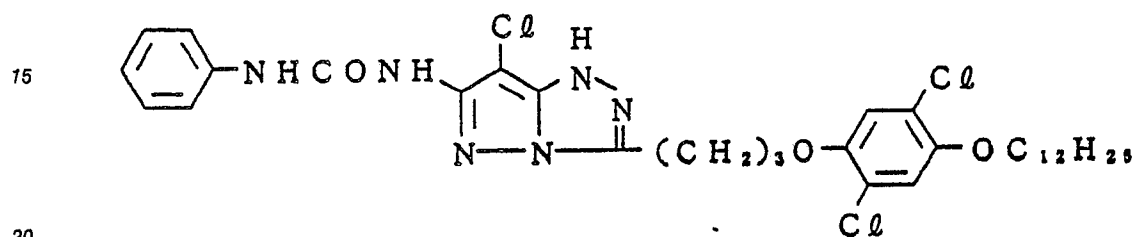
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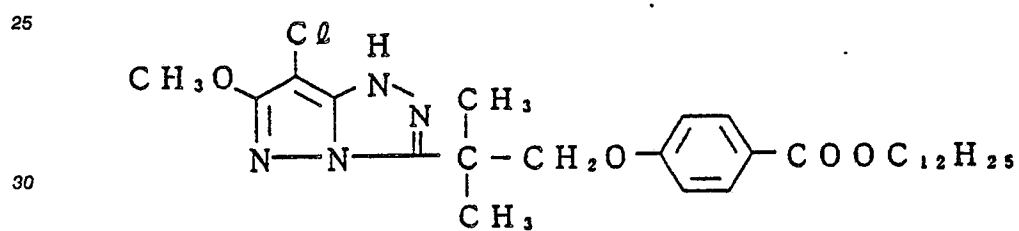
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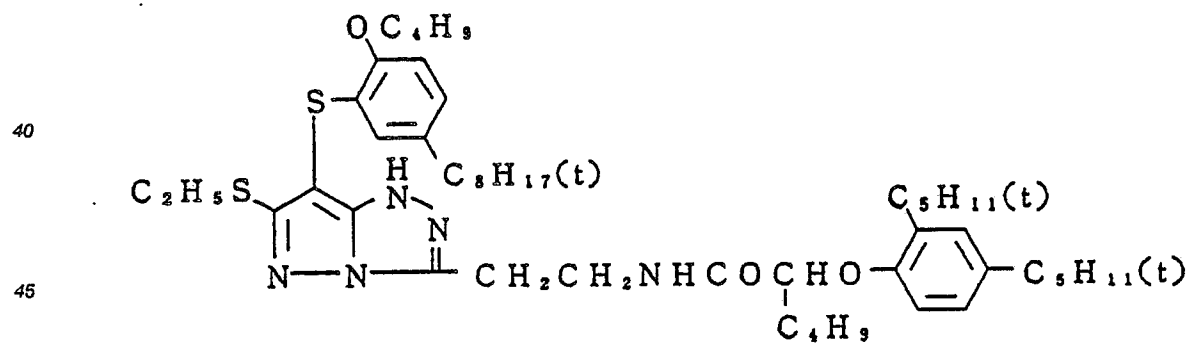
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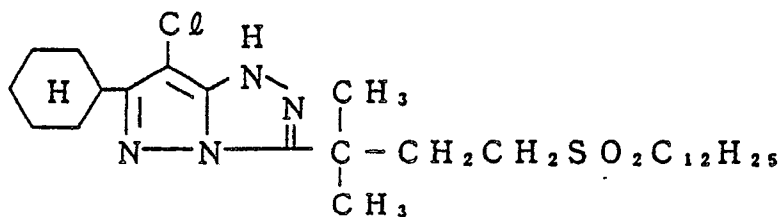
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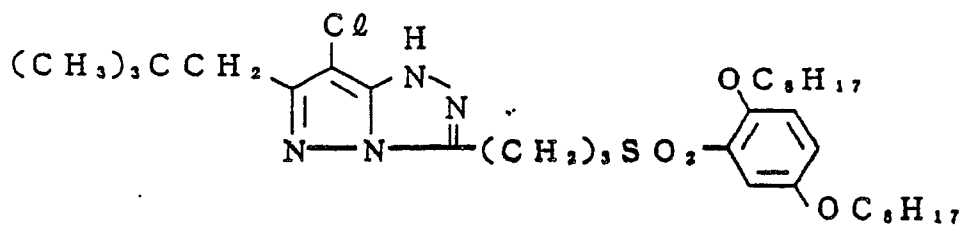
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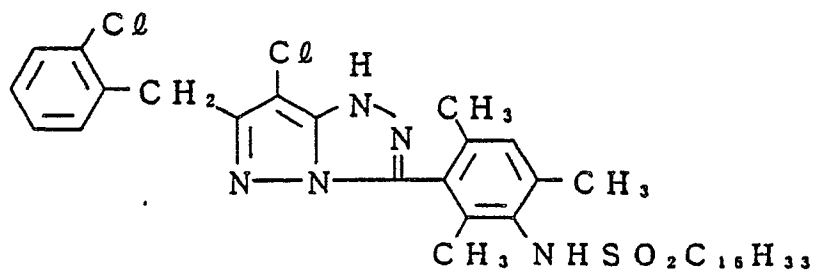
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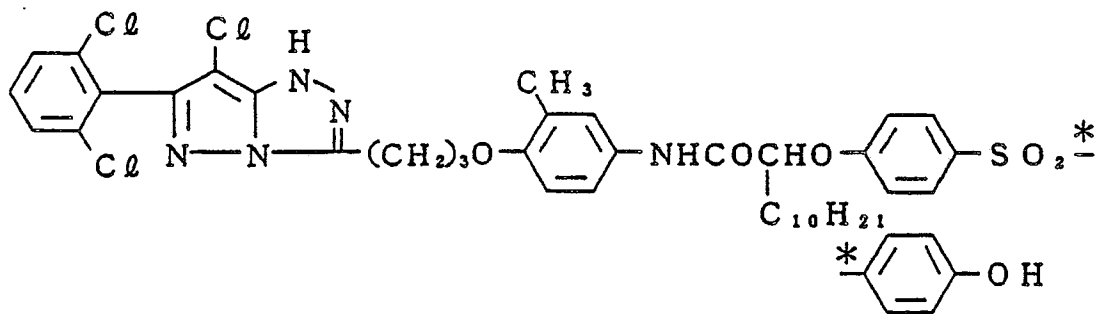
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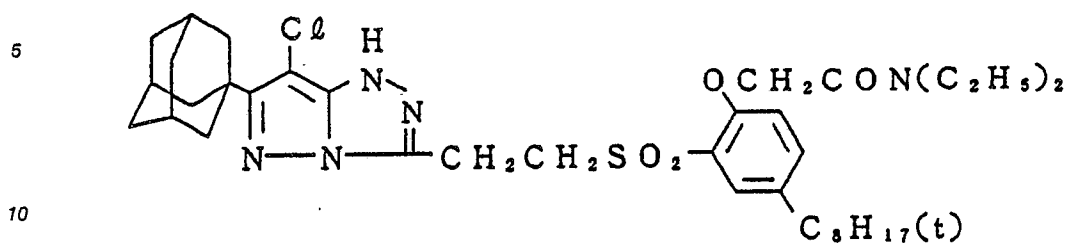
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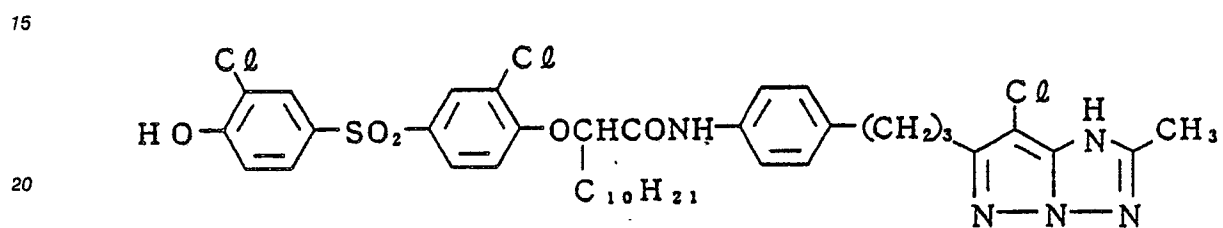
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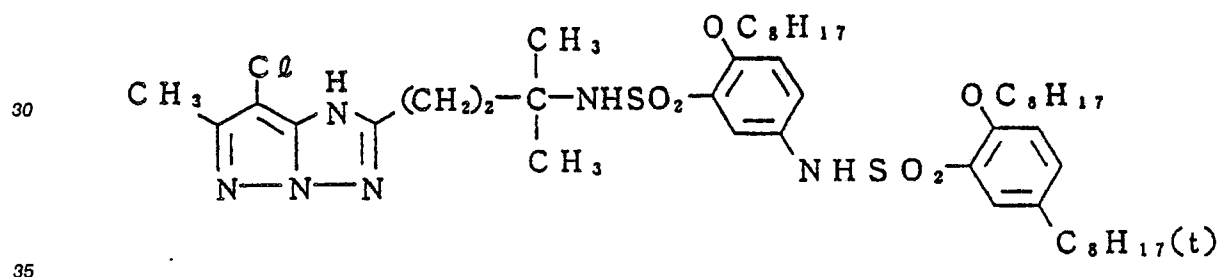
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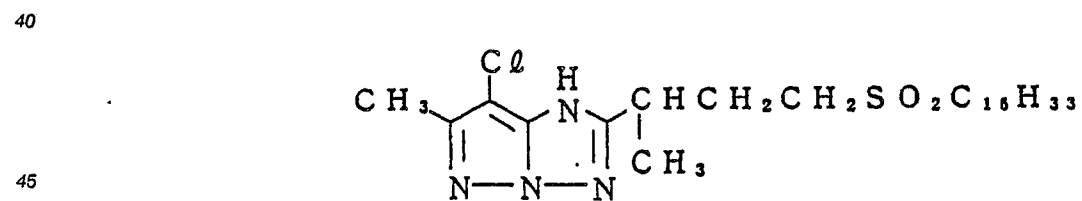
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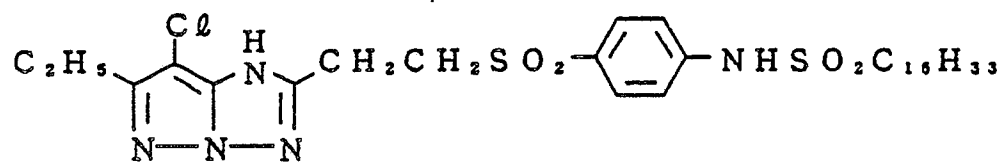


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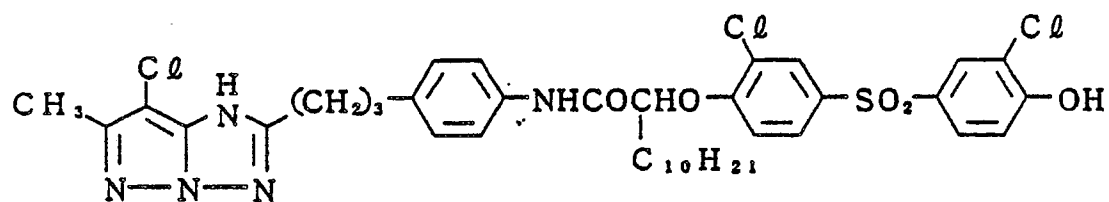
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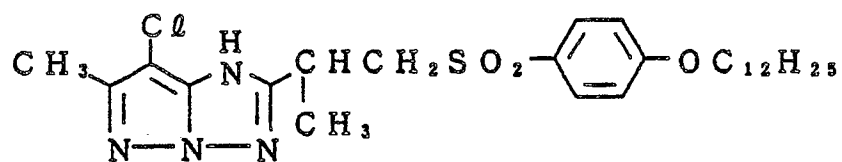
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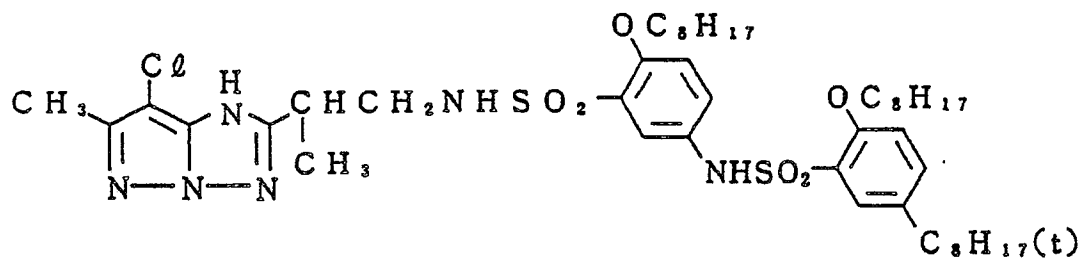
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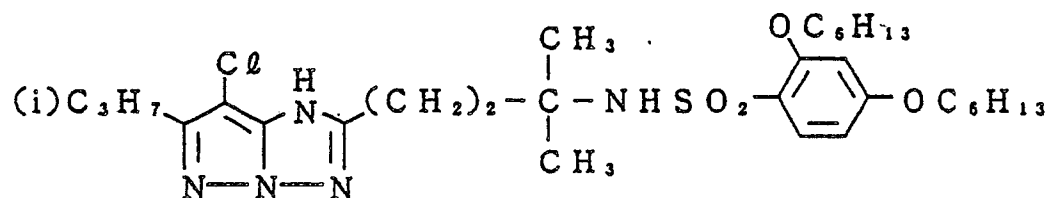
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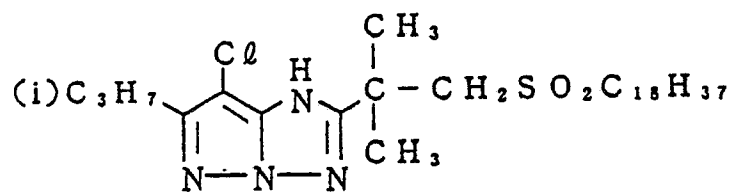


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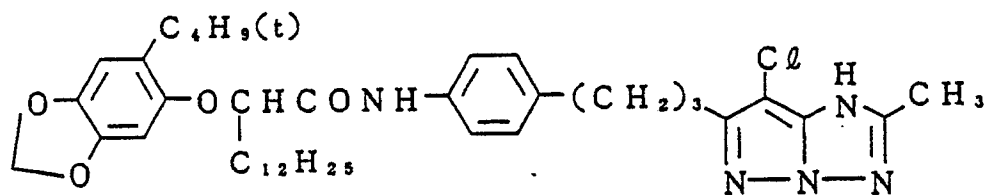
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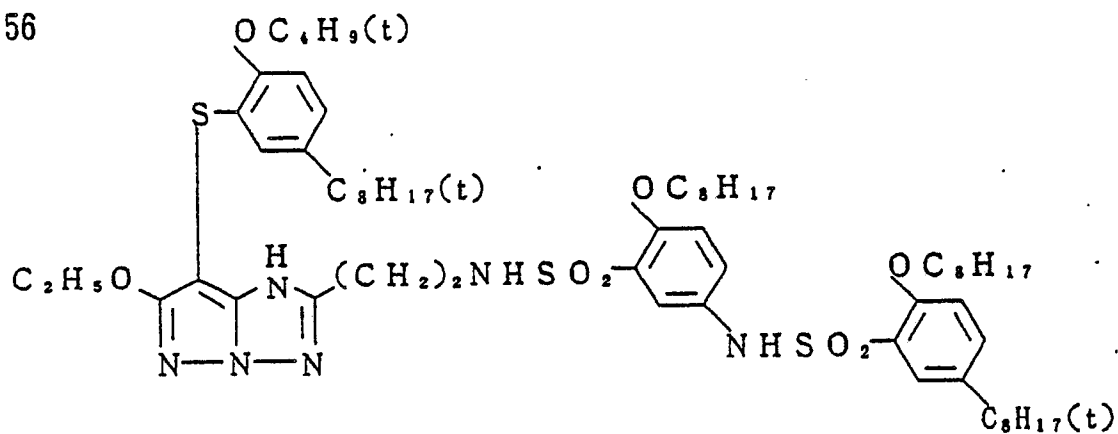


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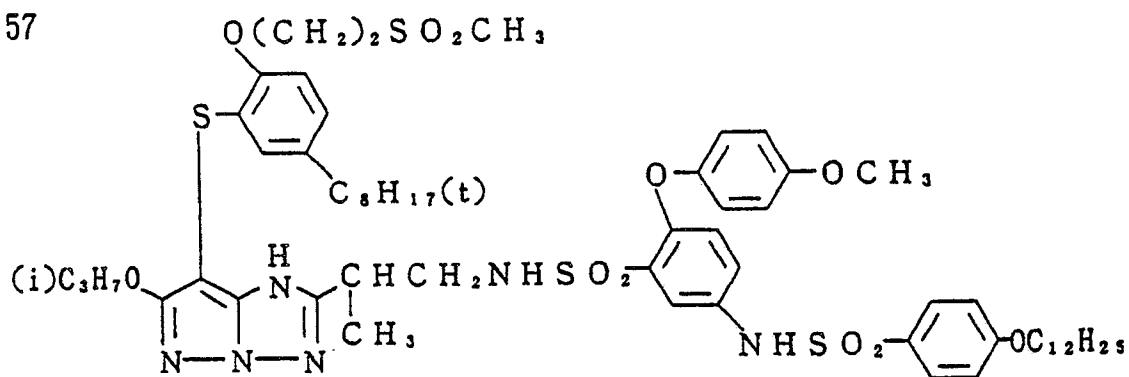


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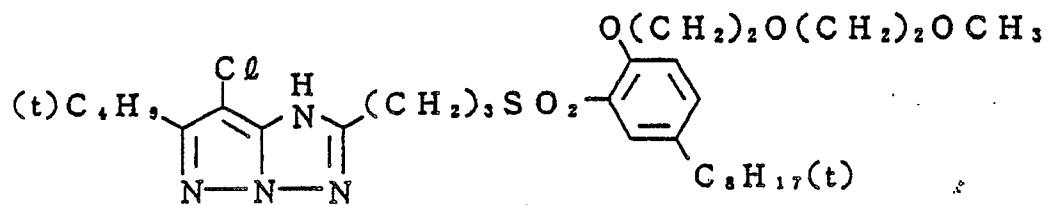
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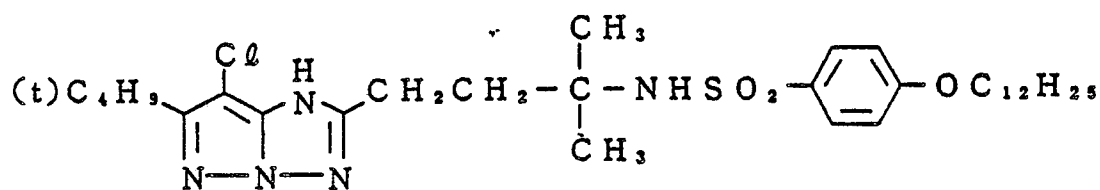
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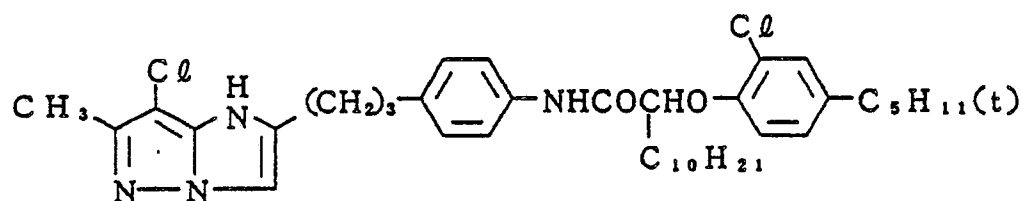
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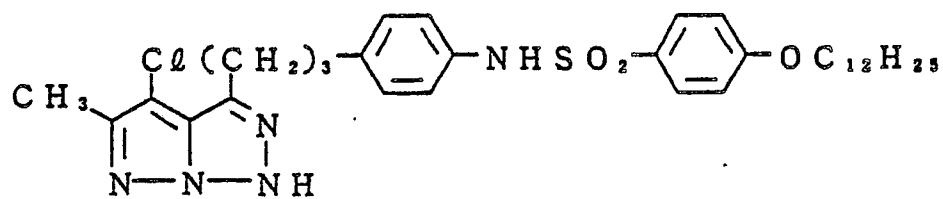
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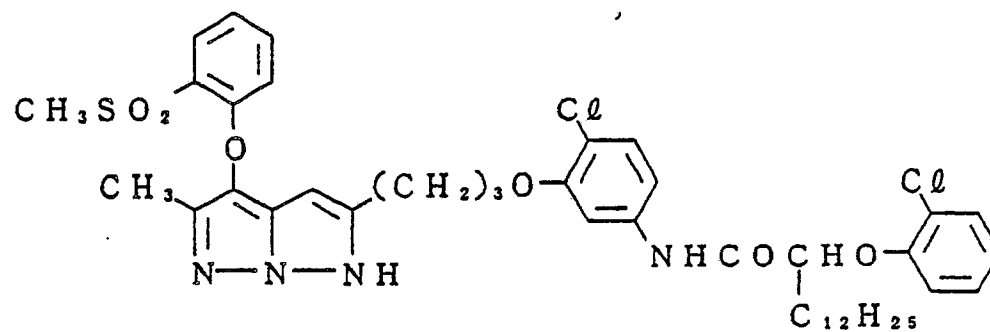


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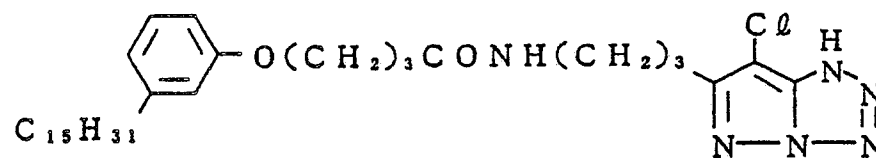
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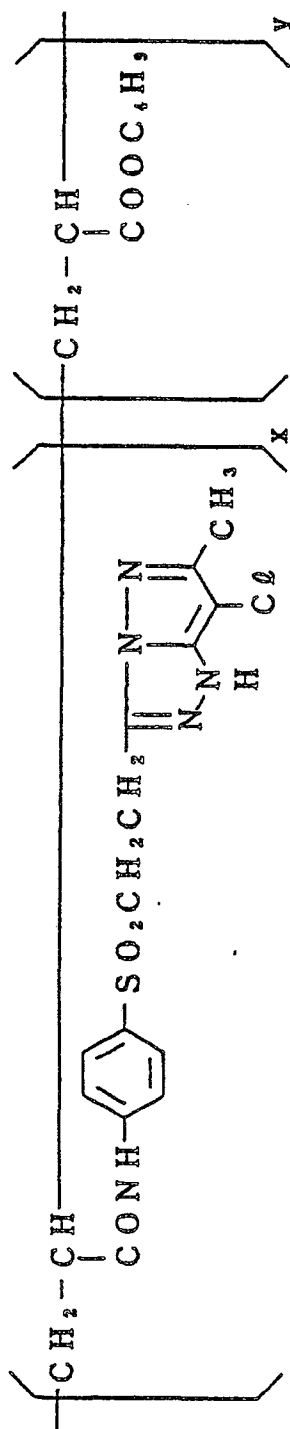
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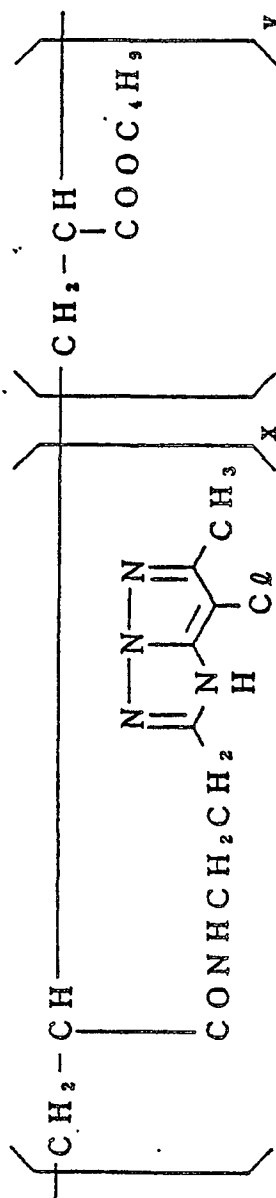
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 $x : y = 50 : 50$

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 $x : y = 50 : 50$

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The Compounds according to the present invention, besides the above exemplified compounds, also include the compounds Nos. 1 to 4, 6, 8 to 17, 19 to 43, 45 to 49, 61 to 104, 106 to 121, 123 to 162, and 164 to 223 out of those compounds disclosed in pages 66 to 122 of Japanese Patent Publication Open to Public Inspection (hereinafter referred to as Japanese Patent O.P.I. Publication) No. 166339/1987. These coupler compounds can be synthesized by making reference to Perkin, the 'Journal of the Chemical Society', I (1977), 2047 through 2052; U.S. Patent No. 3,725,067; Japanese Patent O.P.I. Publication Nos. 99437/1984, 42045/1983, 162548/1984, 171956/1984, 33552/1985, 43659/1985, 172982/1985 and 190779/1985.

The coupler of the invention may be used in the amount range of 1×10^{-3} mole to 1 mole, and preferably 1×10^{-2} to 8×10^{-1} mole per mole of silver halide.

The coupler of the invention may be used in combination with a different-type coupler within the limits

not to impair the effect of this invention.

The DIR compound herein implies a compound from which is split off a development inhibitor or a compound capable of releasing a development inhibitor upon the reaction with the oxidation product of a color developing agent.

5 The compound capable of releasing a development inhibitor may be either one releasing a development inhibitor imagewise or one releasing non-imagewise.

As the one releasing a development inhibitor imagewise, there are those releasing it upon the reaction with the oxidation product of a developing agent, while as the one releasing non-imagewise, there are those utilizing a TIME group, which will be described hereinafter.

10 The following is a typical structural formula of a DIR compound:

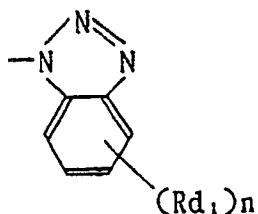
Formula D-1

A-(Y)_m

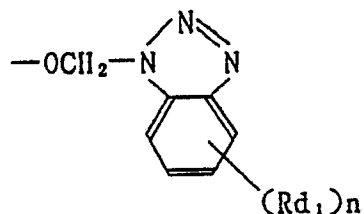
wherein A represents a coupler residue; m is an integer of 1 or 2; Y is a group which is combined to the coupling position of the coupler residue A and which is split off upon the reaction with the oxidation product of a color developing agent, said group being a development inhibitor or a group capable of releasing a development inhibitor.

In Formula D-1, Y is typically represented by the following Formulas D-2 through D-20:

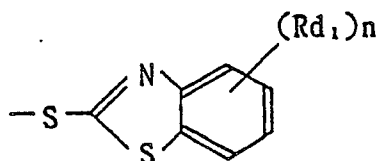
20 **Formula D-2**



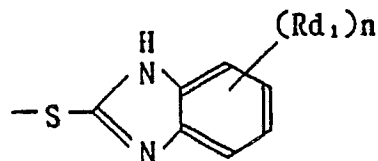
Formula D-3



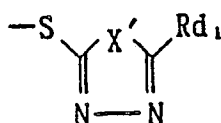
Formula D-4



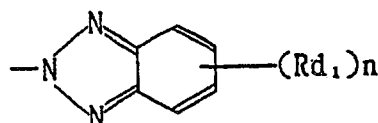
Formula D-5



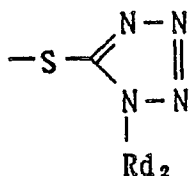
Formula D-6



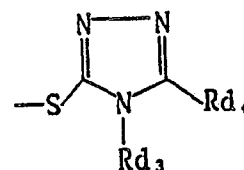
Formula D-7



Formula D-8



Formula D-9



In Formulas D-2 through D-7, Rd_1 represents a hydrogen atom, a halogen atom, or an alkyl, alkoxy, acylamino, alkoxycarbonyl, thiazolidinylideneamino, aryloxycarbonyl, acyloxy, carbamoyl, N-alkylcarbamoyl, N,N-dialkylcarbamoyl, nitro, amino, N-arylcarbamoyloxy, sulfamoyl, N-alkylcarbamoyloxy, hydroxy, alkoxycarbonylamino, alkylthio, arylthio, aryl, heterocyclic, cyano, alkylsulfonyl or aryloxycarbonylamino group; and n is an integer of 0, 1 or 2, provided that when n is 2, the Rd_1 s may be either the same or different, and total number of the carbon atoms contained in the n number of Rd_1 s are from zero up to 10.

The number of carbon atoms contained in the Rd_1 in Formula D-6 is zero to 15.

In Formula D-6, X' represents an oxygen atom or a sulfur atom.

In Formula D-8, Rd_2 represents an alkyl group, an aryl group or a heterocyclic group.

In Formula D-9, Rd_3 represents a hydrogen atom or an alkyl, cycloalkyl, aryl or a heterocyclic group; Rd_4 is a hydrogen atom, a halogen atom or an alkyl, cycloalkyl, aryl, acylamino, alkoxycarbonylamino, aryloxycarbonylamino, alkanesulfonamido, cyano, heterocyclic, alkylthio or amino group.

When Rd_1 , Rd_2 , Rd_3 or Rd_4 represents an alkyl group, the alkyl group includes one having a substituent, and may be either straight-chain or branched-chain.

When Rd_1 , Rd_2 , Rd_3 or Rd_4 represents an aryl group, the aryl group includes one having a substituent.

If Rd_1 , Rd_2 , Rd_3 or Rd_4 represents a heterocyclic group, the heterocyclic group includes one having a substituent, wherein the heterocyclic group is preferably a 5- or 6-member single ring or condensed ring containing at least one hetero atom selected from the group consisting of nitrogen, oxygen and sulfur atoms. The heterocyclic group is selected from among, e.g., pyridyl, quinolyl, furyl, benzothiazole, oxazolyl, imidazolyl, thiazolyl, triazolyl, benzotriazolyl, imido, and oxazine.

In Formula D-8, the number of carbon atoms contained in Rd_2 is from zero to 15.

In Formula D-9, the total number of carbon atoms contained in Rd_3 and Rd_4 is from zero to 15.

Formula D-10

-(TIME) $_n$ -INHIBIT

wherein TIME group is combined to the coupling position of A and is a group capable of being split off upon the reaction with the oxidation product of a color developing agent. After being split-off from the coupler, TIME groups are then in turn further cleaved to eventually moderately control and release an

INHIBIT group; and n is an integer of 1 to 3, provided that when n is 2 or 3, the TIME groups may be either the same or different.

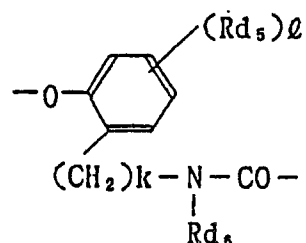
The INHIBIT group is a group represented by one of Formulas D-2 through D-9, which group becomes a development inhibitor due to the above-mentioned release.

5 In Formula D-10, the TIME group is typified by ones represented by the following Formulas D-11 through D-19:

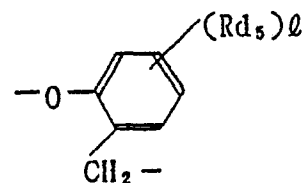
Formula D-11

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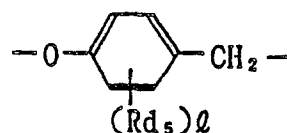
Formula D-12



Formula D-13

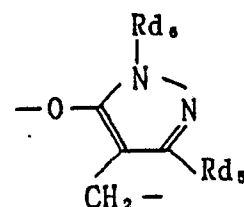
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Formula D-14

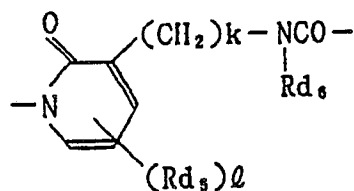
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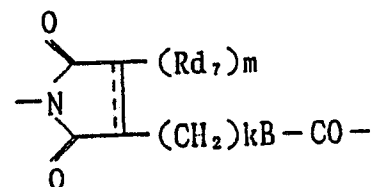
Formula D-15

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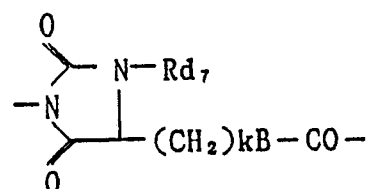
Formula D-16



Formula D-17

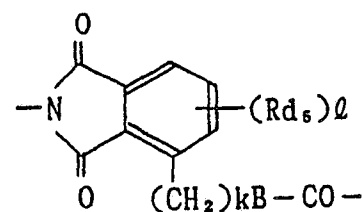
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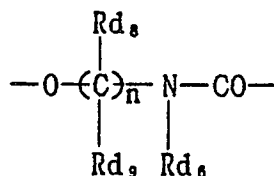


Formula D-18

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Formula D-19



In Formulas D-11 through D-15 and D-18, Rd_5 represents a hydrogen atom, a halogen atom, or an alkyl, cycloalkyl, alkenyl, aralkyl, alkoxy, alkoxycarbonyl anilino, acylamino ureido, cyano, nitro, sulfonamido, sulfamoyl, carbamoyl, aryl, carboxy, sulfo, hydroxy or alkanesulfonyl group, provided that in Formulas D-11 to D-13, D-15 and D-18, the Rd_5 s may combine with one another to form a condensed ring. In Formulas D-11, D-14, D-15 and D-19, Rd_6 is an alkyl, alkenyl, aralkyl, cycloalkyl, heterocyclic or aryl group. In Formulas D-16 and D-17, Rd_7 is a hydrogen atom or an alkyl, alkenyl, aralkyl, cycloalkyl, heterocyclic or aryl group. In Formula D-19, Rd_8 and Rd_9 each represents a hydrogen atom or an alkyl group having preferably 1 to 4 carbon atoms. In Formulas D-11 and D-15 through D-18, k is an integer of zero, 1 or 2; in Formulas D-11 through D-13, D-15 and D-18, l is an integer of 1 to 4; and in Formula D-16, m is an integer of 1 or 2. When l and m each is 2 or more, the Rd_5 s and Rd_7 s may be either the same or different, respectively. In Formula D-19, n is an integer of 2 to 4. The n Rd_8 s and n Rd_9 s may be independently the same or different. In Formulas D-16 through D-18, B represents an oxygen atom or $-\text{N}(\text{Rd}_6)-$, wherein Rd_6 is as defined previously. In Formula D-16, $---$ may be either a single bond or double bonded and when it is a single bond, m is 2, while when it is a double bond, m is 1.

Formula D-20

$\{T_1\}_1-\text{SR}\{T_2\}_m$ INHIBIT

wherein T_1 is a component which splits off the $\text{SR}\{T_2\}_m$ INHIBIT, wherein SR is a component which, after the $\text{SR}\{T_2\}_m$ INHIBIT, is produced, produces a $\{T_2\}_m$ INHIBIT by the reaction with the oxidation product of a developing agent, T_2 is a component which, after the $\{T_2\}_m$ INHIBIT is produced, splits off an INHIBIT, and INHIBIT is a development inhibitor; and l and m each is an integer of zero or 1.

The component represented by SR need only be one capable of forming the above component by the reaction with the oxidation product of a developing agent, and includes, e.g., a coupler component which effects coupling reaction with the oxidation product of a developing agent and a redox component which effects redox reaction with the oxidation product of a developing agent.

The coupler component includes yellow couplers, magenta couplers and cyan couplers, such as acylacetanilides, 5-pyrazolones, pyrazoloazoles, phenols, naphthols, acetophenones, indanones, carbamoylacetanilides, 2(5H)-imidazolones, 5-isooxazolones, uracils, homophthalimides, oxazolones, 2,5-thia diazoline-1,1-dioxides, triazolothiadiazines, indoles, and also includes other compounds capable of forming various dyes or compounds forming no dyes.

The $\{T_1\}_1-\text{SR}\{T_2\}_m$ INHIBIT preferably combines to the active site of the A component in Formula D1.

When SR is a coupler component, the SR combines with $\{T_1\}_1$ and $\{T_2\}_m$ INHIBIT so that it functions as a coupler after being cleaved from the $\{T_1\}_1$. For example, when a coupler component is a phenol-type or naphthol-type compound, the oxygen atom of its hydroxyl group, when it is a 5-pyrazolone, the oxygen atom of the 5th-position hydroxyl group or of the 2nd-position nitrogen atom of its tautomer, or when it is an acetophenone or an indanone, the oxygen atom of the hydroxyl group of its tautomer preferably combines with the $\{T_1\}_1$ and the $\{T_2\}_m$ INHIBIT preferably combines to the active site of the coupler.

When SR is a redox component, examples of the redox component include hydroquinones, catechols, pyrogallols, aminophenols such as p-aminophenols and o-aminophenols, naphthalenediols such as 1,2-naphthalenediols, 1,4-naphthalenediols and 2,6-naphthalenediols, aminonaphthols such as 1,2-aminonaphthols, 1,4-aminonaphthols and 2,6-aminonaphthols. Also, when SR is a redox component, the SR combines with $\{T_1\}_1$ and $\{T_2\}_m$ INHIBIT so that it functions as the redox component after being cleaved from the $\{T_1\}_1$.

The groups represented by T_1 and T_2 include those represented by Formulas D-11 through D-19.

The development inhibitor represented by INHIBIT includes those represented by Formulas D-2 through D-9.

Preferred among the DIR compounds are those of which the group of Y is represented by Formula D-2,

D-3, D-8, D-10 or D-20. Among those with the groups Y represented by Formulas D-10 and D-20, the preferred are ones whose INHIBIT is represented by Formula D-2, D-3, D-6 (particularly when the X of Formula D-6 is an oxygen atom) or D-8.

The coupler component represented by A in Formula D-1 includes a yellow dye image forming coupler residue, a magenta dye image forming coupler residue, a cyan dye image forming coupler residue and a colorless coupler residue.

The following are useful examples of the DIR compounds for the invention, but are not limited to the examples.

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Exemplified compounds

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D-1

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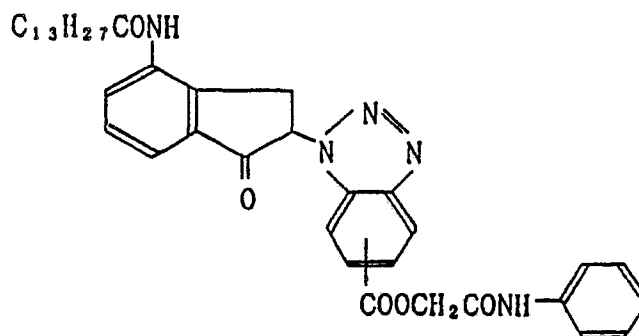
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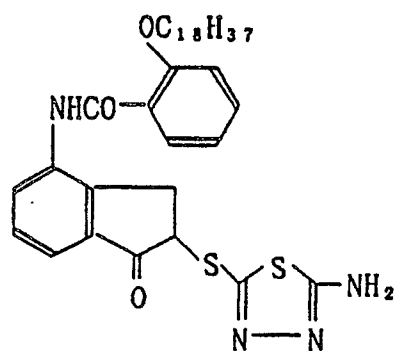
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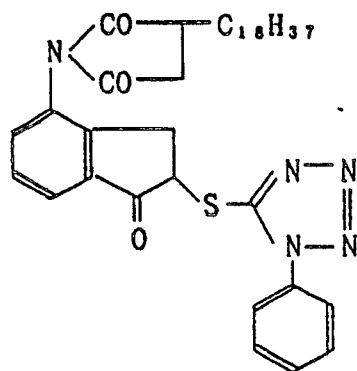
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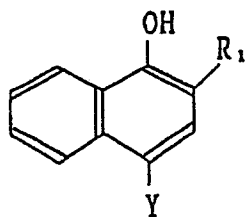


D-36



D-37

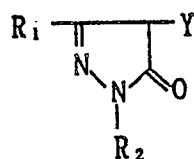




Exemplified compound No.	R ₁	Y
D - 15	(17)	(38)
D - 16	(17)	(39)
D - 17	(18)	(40)
D - 18	(19)	(41)
D - 19	(18)	(42)
D - 20	(18)	(43)
D - 21	(18)	(44)
D - 22	(18)	(45)
D - 23	(18)	(46)
D - 24	(20)	(47)
D - 25	(20)	(48)
D - 26	(21)	(49)
D - 27	(21)	(50)
D - 28	(21)	(51)
D - 29	(22)	(52)
D - 30	(18)	(53)
D - 31	(18)	(54)
D - 32	(22)	(49)
D - 34	(18)	(56)
D - 38	(19)	(46)
D - 39	(18)	(57)
D - 41	(18)	(60)
D - 42	(18)	(48)
D - 44	(18)	(58)

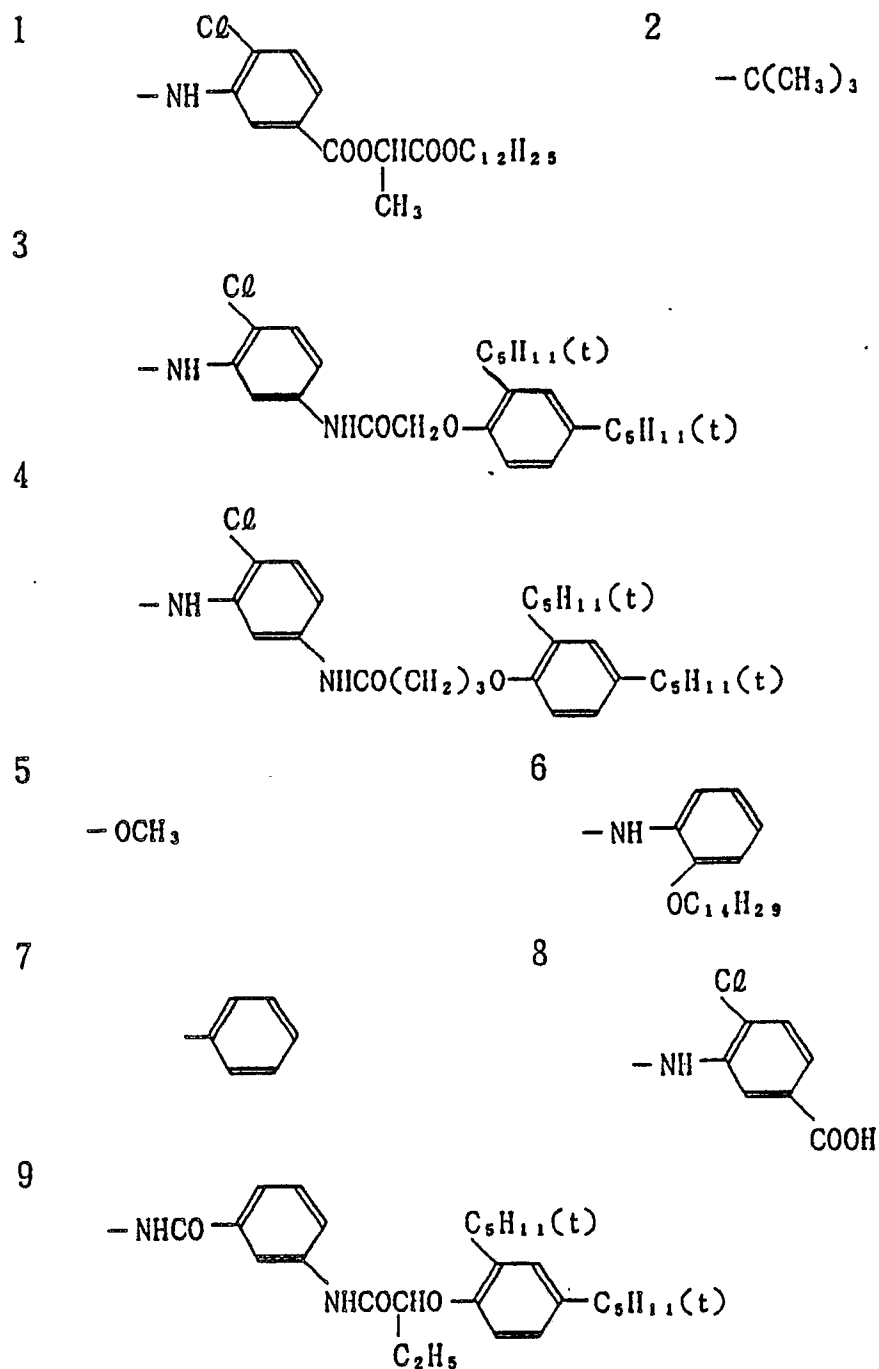


Exemplified compound No.	R ₁	R ₂	Y
D - 2	(1)	(1)	(30)
D - 3	(2)	(3)	(30)
D - 4	(2)	(4)	(30)
D - 5	(5)	(6)	(31)
D - 6	(2)	(4)	(32)
D - 7	(2)	(3)	(32)
D - 8	(7)	(8)	(33)
D - 33	(2)	(4)	(55)
D - 40	(2)	(4)	(56)
D - 43	(2)	(25)	(59)

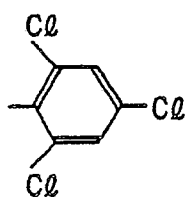


Exemplified compound No.	R ₁	R ₂	Y
D - 9	(9)	(10)	(30)
D - 10	(11)	(10)	(30)
D - 11	(12)	(7)	(34)
D - 12	(12)	(13)	(35)
D - 13	(9)	(14)	(36)
D - 14	(15)	(16)	(37)
D - 35	(56)	(24)	(23)

In the table, the R₁, T₂ and Y represent the following groups.



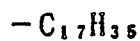
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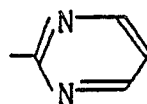
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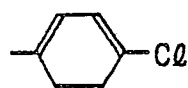
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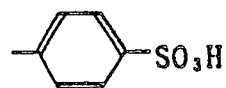
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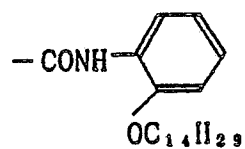
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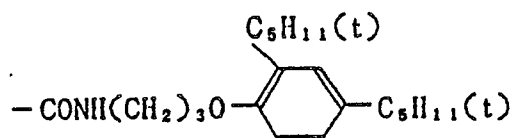
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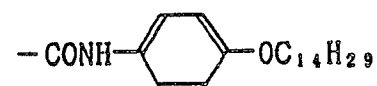
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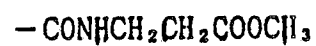
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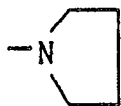
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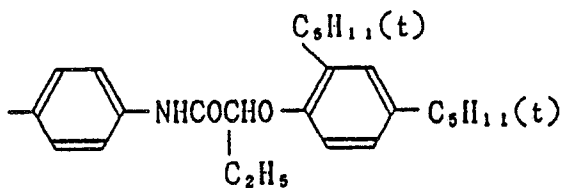
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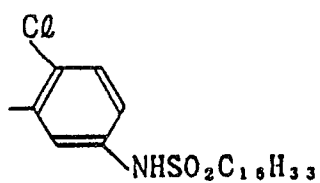
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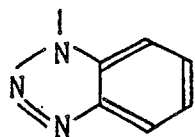
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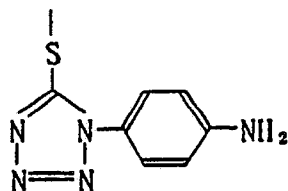
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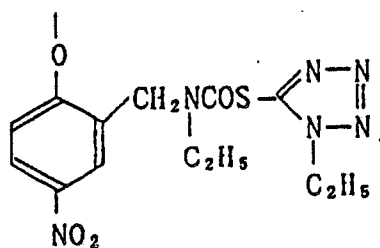
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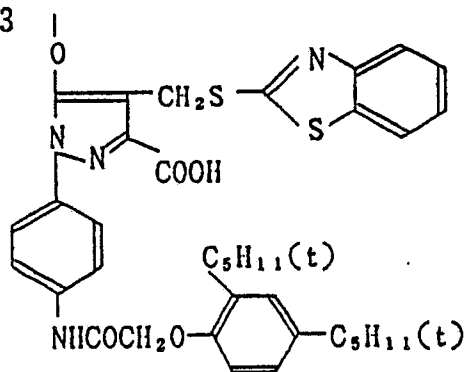
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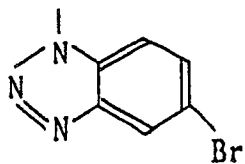
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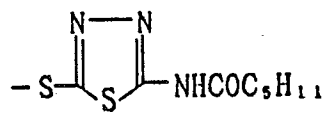
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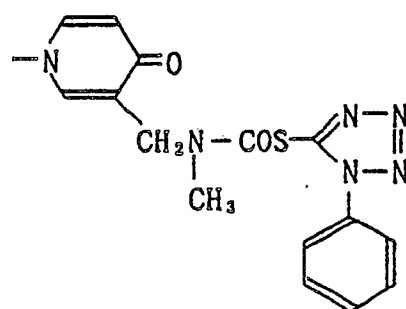
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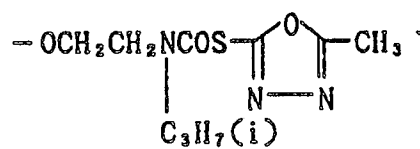
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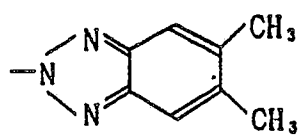
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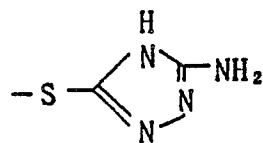
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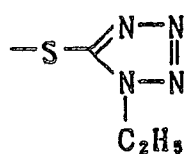
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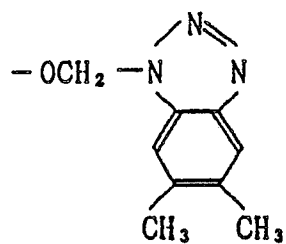
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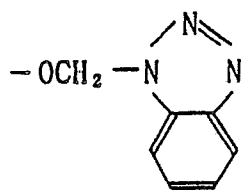
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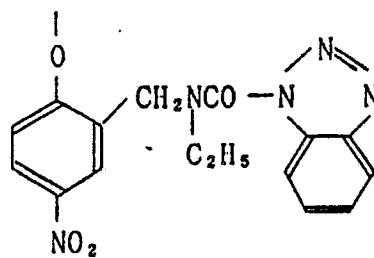
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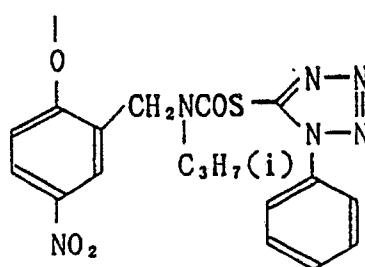
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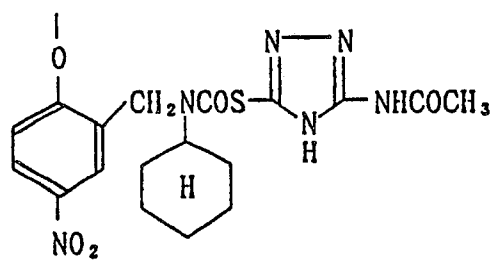
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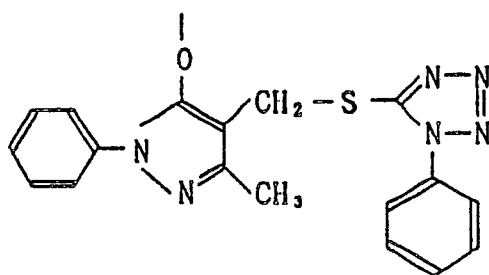
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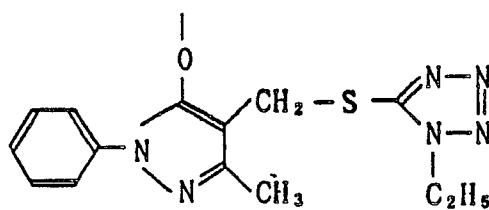
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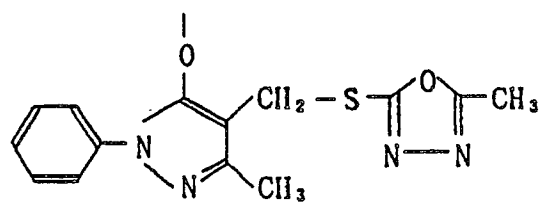
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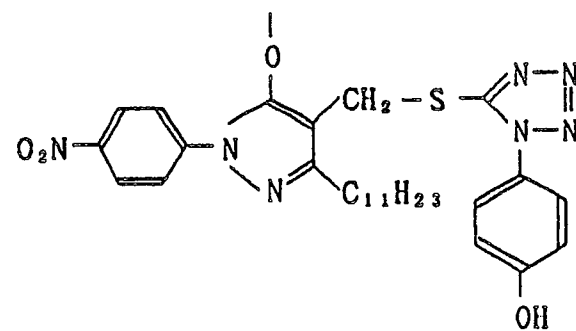
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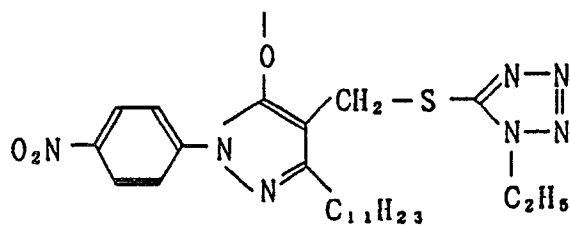


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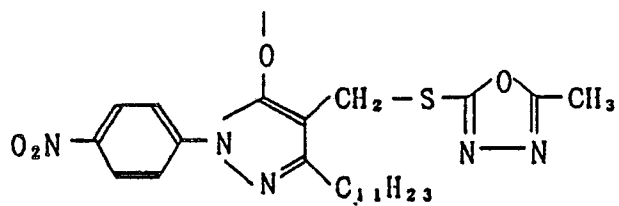
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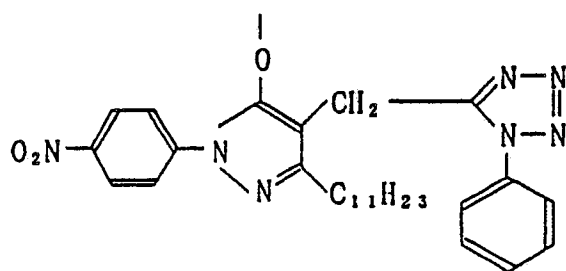
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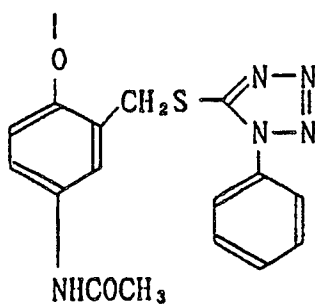
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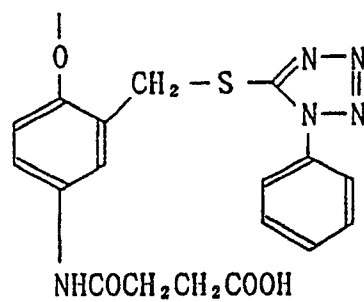
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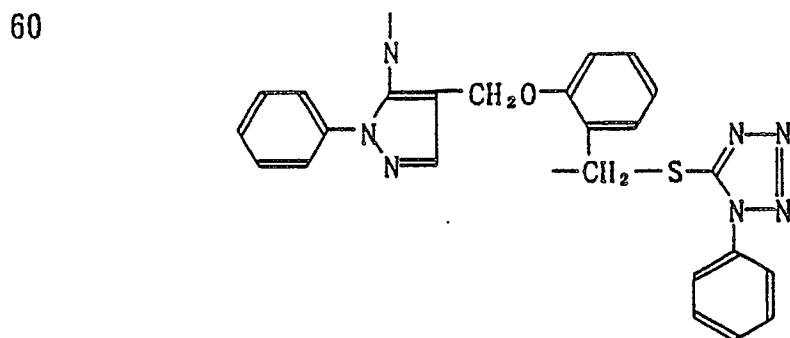
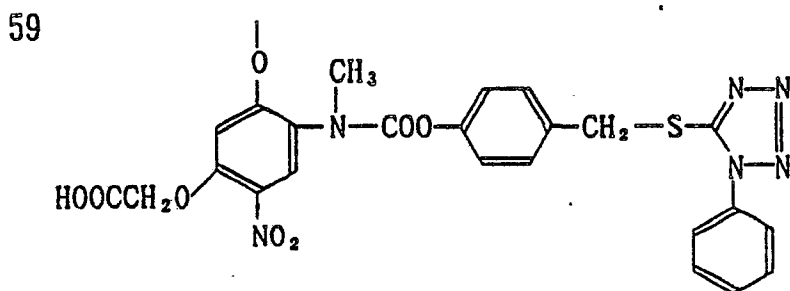
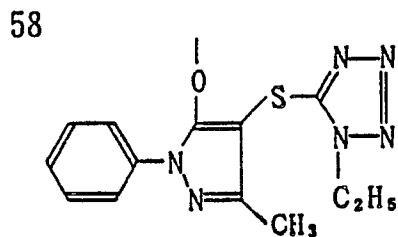
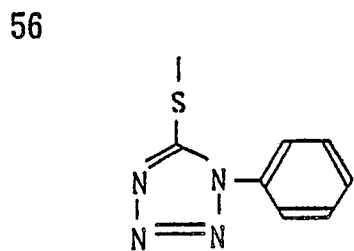
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To the silver halide emulsion may be added an antifoggant, a stabilizer, etc. It is advantageous to use

gelatin as the binder of the emulsion.

The emulsion layer and other hydrophilic colloid layers may be hardened, and may contain a plasticizer or a less-soluble synthetic polymer dispersion (latex).

Dye-forming couplers are used in the emulsion layers of the color photographic light-sensitive material
5 of the invention.

Further, there may be used color correction effect-having colored couplers, competing couplers, and compounds which, as a result of coupling with the oxidation product of a developing agent, release photographically useful fragments such as a developing agent, a silver halide solvent, a toning agent, a hardener, an antifoggant, a chemical sensitizer, a spectral sensitizer and a desensitizer.

10 The light-sensitive material may comprise auxiliary layers such as a filter layer, an antihalation layer, an antiirradiation layer and the like. These layers and/or emulsion layers may contain a dye which dissolves out of the light-sensitive material or is bleached in the course of processing.

To the light-sensitive material may be added various agents such as a formalin scavenger, a brightening agent, a matting agent, a lubricant, an image stabilizer, a surfactant, a color fog inhibitor, a
15 developement accelerator, a development moderater and a bleaching accelerator.

As the support of the light-sensitive material, polyethylene-laminated paper, polyethylene terephthalate film, baryta paper, cellulose triacetate film or the like may be used.

When processing the light-sensitive material of the invention to obtain a dye image, the processing may be carried out by a generally known color photographic processing method after camera exposure.

20

EXAMPLES

25 The present invention will be further detailed by the following examples.

(Preparation Example 1)

30

Preparation of a seed emulsion

To 500 ml of an aqueous 2.0% gelatin solution heated up to 40 °C was added 5×10^{-5} mole of K_3RhCl_6 , and then, in accordance with the method described in Japanese Patent O.P.I. Publication No.45437/1975,
35 were added in 35 minutes 250 ml of a 4M (molar concentration) $AgNO_3$ aqueous solution and 250 ml of a 4M KBr aqueous solution while controlling pAg and pH of the reaction system at 9.0 and 2.0, respectively, by a controlled double-jet method. The gelatin solution containing the total AgX grains was adjusted to pH5.5 with a potassium carbonate solution, and then to it were added 364 ml of a 5% aqueous solution of Demol N as a precipitant, a product of Kawo Atlas Co., and 244 ml of a 20% aqueous solution of
40 magnesium sulfate as a polyvalent ion for coagulation, it was then allowed to stand for flocculation, and the supernatant was removed by decantation. Then, to it were added 1,400 ml of distilled water for redispersion and then 36.4 ml of a 20% magnesium sulfate solution for recoagulation, and after removing the supernatant by decantation, an aqueous solution containing 28g of osein gelatin was added to make the whole amount 425 ml for dispersion at 40 °C for 40 minutes to thereby prepare a AgX seed emulsion.

45 The obtained emulsion was regarded as NE-1. The NE-1, when observed through an electron microscope, was a monodisperse emulsion comprising cubic grains having an average grain size of 0.093 μ m.

Subsequently, seed emulsion NE-2 was prepared under the same conditions as in Preparation Example 1 except that the K_3RhCl_6 was removed. As a result of electron-microscopic observation, the emulsion was
50 a monodisperse emulsion comprising cubic grains having an average grain size of 0.093 μ m.

The results are shown in Table 1.

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Table 1

Seed EM No.	Additive	Added amount	Grain size
		(mol/mol of Ag)	(μm)
NE-1	K_3RhCl_6	5×10^{-5}	0.093
NE-2	--	--	0.093

EXAMPLE 1

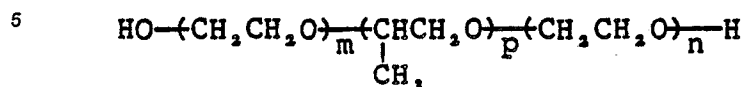
(Preparation method)

The seed emulsions prepared in Preparation Example 1 and the seven different solutions shown below were used to prepare core/shell-type monodisperse silver iodobromide emulsions Em-1 and Em-2 each having an average grain size of $0.4\mu\text{m}$ and an average AgI content of 8 mole% in compositions comprising 15 mole%, 5 mole% and 3 mole% AgI contents in order from the inside core of the grain.

The emulsions and the details thereof are as shown in Table 2.

(Solution A)

Osein gelatin 28.6 g



[Ethanol solution of Pronone having an average
molecular weight of 1700 (product of Nippon Oils
and Fats Co., Ltd.)] 16.5 ml

TAI* 247.5 mg

56% aqueous acetic acid solution 72.6 ml

28% aqueous ammonia solution 97.2 ml

Seed emulsion prepared in

Preparation Example 1 0.134 mol equivalent in terms of Ag
Distilled water to make 6600 ml.

(Solution B)

Osein gelatin 13 g

KBr 460.2 g

KI 113.3 g

TAI 665 mg

Distilled water to make 1300 ml

(Solution C)

	Osein gelatin	17 g
	KBr	672.6 g
5	KI	49.39g
	TAI	870 mg

Distilled water to make 1700 ml.

(Solution D)

	Osein gelatin	8 g
15	KBr	323.2 g
	KI	13.94g
	TAI	409 mg

Distilled water to make 800 ml.

(Solution E)

25	AgNO ₃	1777.2 g
	28% aqueous ammonia solution	1470 ml

Distilled water to make 2989 ml

(Solution F)

20% aqueous KBr solution

an amount necessary for pAg adjustment

(Solution G)

56% aqueous acetic acid solution

an amount necessary for pH adjustment

***TAI: 4-hydroxy-6-methyl-1,3,3a,7-tetrazaindene**

With stirring, by using a mixer-stirrer, to Solution A were added at 40° C Solution E and Solution B in a simultaneous mixing manner, upon completion of the addition of Solution B, Solution C was added, and then upon completion of the addition of Solution C, Solution D was added. Control of pAg and pH during the simultaneous mixing and the adding speeds of Solutions E, B, C and D were performed as shown below.

The control of pAg and pH was carried out by changing the flow of Solutions F and G with a flow-variable roller tube pump.

After completion of the addition of Solutions D and E, the pH was adjusted to 6.0 with use of Solution G. Subsequently, the product was subjected to desalting and washing in usual manner, and then dispersed into an aqueous solution containing 197.4g of osein gelatin.

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Solution adding conditions			
Solution E		Solution B	
Time	Adding speed	Time	Adding speed
(min.)	(ml/min.)	(min.)	(ml/min.)
0.0	8.4	0.0	8.0
2.8	12.7	2.8	12.2
4.8	17.0	4.8	16.3
19.0	57.2	8.7	26.7
21.5	58.6	16.2	48.8
30.7	38.7	19.5	55.3
36.6	32.1	21.0	56.6
41.5	29.2	22.0	55.0
45.6	29.3	27.8	42.5
47.5	31.0	29.9	38.3
49.4	35.3	31.5	37.2
58.7	48.3	33.1	35.3
64.2	60.8	34.8	33.8
70.1	83.4	36.6	32.7
71.2	83.4	38.5	32.2

Solution C		Solution D	
Time	Adding speed	Time	Adding speed
(min.)	(ml/min.)	(min.)	(ml/min.)
38.5	32.2	54.8	40.9
39.5	32.2	56.8	43.9
40.5	32.5	58.7	47.1
41.5	33.0	60.5	50.5
42.5	33.8	61.6	52.9
43.5	35.1	62.7	55.4
44.5	36.9	63.7	57.9
45.6	39.4	64.7	60.6
46.6	42.8	65.7	63.4
47.5	47.7	66.6	66.3
48.5	54.7	67.4	69.3
49.4	34.4	68.2	72.5
51.8	37.1	69.0	75.8
53.3	39.0	70.1	81.1
54.8	40.9	71.2	81.1
Time	pH	Time	pH
(min.)		(min.)	
0.0	9.00	0.0	8.55
4.8	8.92	30.7	8.55
9.7	8.77	32.3	8.71
11.5	8.70	33.9	8.88
13.0	8.62	35.7	9.04
14.4	8.55	37.5	9.21
15.6	8.47	39.5	9.37
17.9	8.32	41.5	9.54
20.0	8.17	43.5	9.70
23.1	7.95	45.6	9.87
25.3	7.80	46.6	9.95
27.8	7.65	47.5	10.03
29.2	7.57	48.5	10.11
30.7	7.50	49.4	10.20
71.2	7.50	71.2	10.20

Table 2

Content of seed emulsion				
Em No.	Seed Em No.	Metallic ion contained in seed em.	Average grain size(μ m)	Coefficient of variation
Em-1	NE-1	Rh	0.4	0.19
Em-2	NE-2	None	0.4	0.19

On a subbed cellulose acetate support was prepared a multilayer color light-sensitive material sample No.101 of a double-emulsion-layer construction comprising the following compositions.

The coated weights of the silver halide and colloidal silver are given in silver equivalent amounts in

g/m², those of the additives and gelatin are given in g/m², and those of the sensitizing dyes, couplers and DIR compounds are given in molar amounts per mole of silver halide in the following table.

The emulsions contained in the respective color-sensitive emulsion layers are ones optimally chemically sensitized by sodium thiosulfate and chloroauric acid.

5

	Layer	Principal composition	Amount
10	Layer 1 (HC) (antihalation layer)	Black colloidal silver	0.20
		Gelatin	1.5
		Ultraviolet absorbing agent UV-1	0.1
15		'' UV-2	0.2
		Diethyl phthalate (DOP)	0.03
20	Layer 2 (IL-1) (intermediate layer)	Gelatin	2.0
		Antistain agent AS-1	0.1
		DOP	0.1
25	Layer 3 (R-1) (first red-sensitive emulsion layer)	Em-2	1.2
		Gelatin	1.1
		Sensitizing dye I	6×10^{-5}
30		'' II	1×10^{-5}
		Coupler C-1	0.06
		Coupler CC-1	0.003
35		DIR compound D-23	0.0015
		DIR compound D-39	0.002
		DOP	0.6
40	Layer 4 (R-2) (second red-sensitive emulsion layer)	Em-A*	0.8
		Gelatin	1.1
		Sensitizing dye I	3×10^{-5}
45		'' II	1×10^{-5}
		Coupler C-1	0.03
50		DIR compound D-39	0.001
		DOP	0.2

(Continued)

55

	Layer 5 (IL-2) (intermediate layer)	Gelatin	0.8
5		AS-1	0.03
		DOP	0.1
	Layer 6 (G-1) (first green- sensitive emulsion layer)	Em-2	1.4
10		Gelatin	1.2
		Sensitizing dye III	2.5×10^{-5}
		'' IV	1.2×10^{-5}
15		Coupler (exemplified Compound 4)	0.045
		Coupler CM-1	0.009
		DIR compound D-23	0.001
20		DIR compound D-26	0.003
		Tricresyl phosphate (TCP)	0.5
	Layer 7 (G-2) (second green- sensitive emulsion layer)	Em-A*	1.3
25		Gelatin	0.8
		Sensitizing dye III	1.5×10^{-5}
		'' IV	1.0×10^{-5}
		Coupler (exemplified compound 4)	0.03
		DIR compound D-26	0.001
30		TCP	0.3
	Layer 8 (YC) (yellow filter layer)	Gelatin	0.6
		Yellow colloidal silver	0.08
40		AS-1	0.1
		DOP	0.3

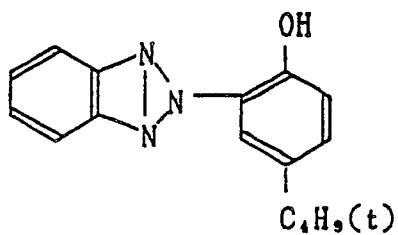
(Continued)

5	Layer 9 (B-1) (first blue-sensitive emulsion layer)	Em-2	0.5
		Gelatin	1.1
		Sensitizing dye V	1.3×10^{-5}
		Coupler Y-1	0.29
		TCP	0.2
15	Layer 10 (B-2) (second blue-sensitive emulsion layer)	Em-A*	0.7
		Gelatin	1.2
		Sensitizing dye V	1×10^{-5}
		Coupler Y-1	0.08
		DIR compound D-39	0.0015
25	Layer 11 (Pro-1) (first protective layer)	TCP	0.1
		Gelatin	0.55
		Ultraviolet absorbing agent UV-1	0.1
		UV-2	0.2
		DOP	0.03
35	Layer 12 (Pro-2) (second protective layer)	Silver iodobromide AgI 1 mol% average grain size $0.07 \mu\text{m}$	0.5
		Gelatin	0.5
		Polymethyl methacrylate particles of a particle diameter of $1.5 \mu\text{m}$	0.2
		Formalin scavenger HS-1	3.0
		Hardener H-1	0.4

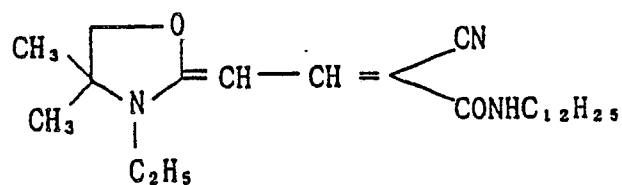
*Em-A: A silver iodobromide emulsion having an average AgI content of 8.5 mol% and an average grain size of $0.7 \mu\text{m}$, prepared in making reference to the foregoing preparation method, in which the AgI content is higher in the inside of the grain.

To each of the above layers was added a surface active agent as a coating aid in addition to the above components.

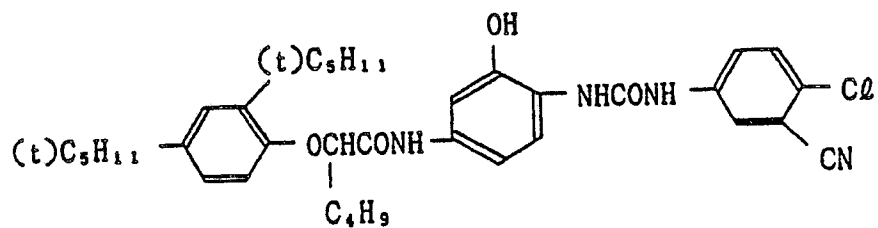
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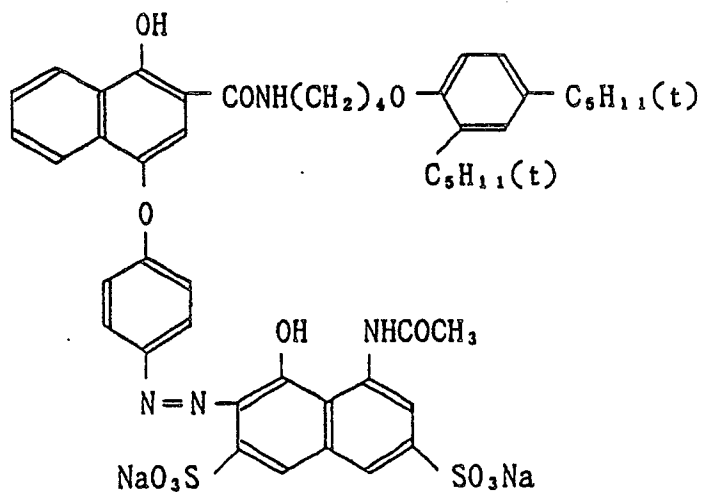
UV-2



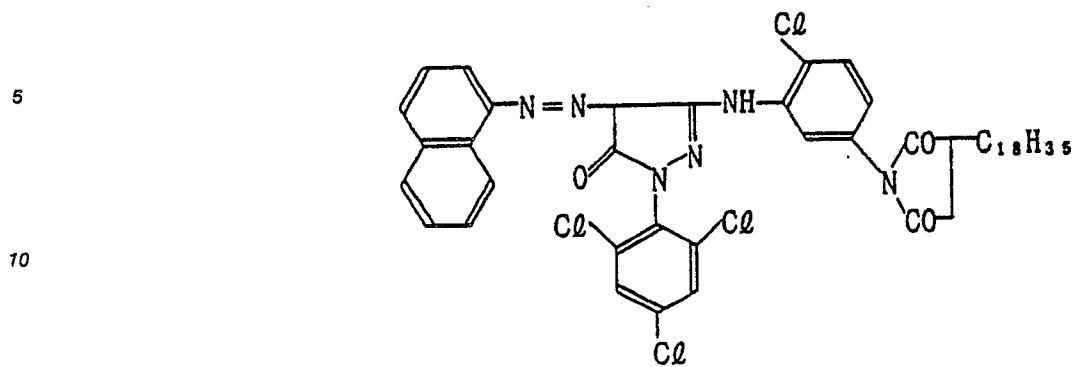
C-1



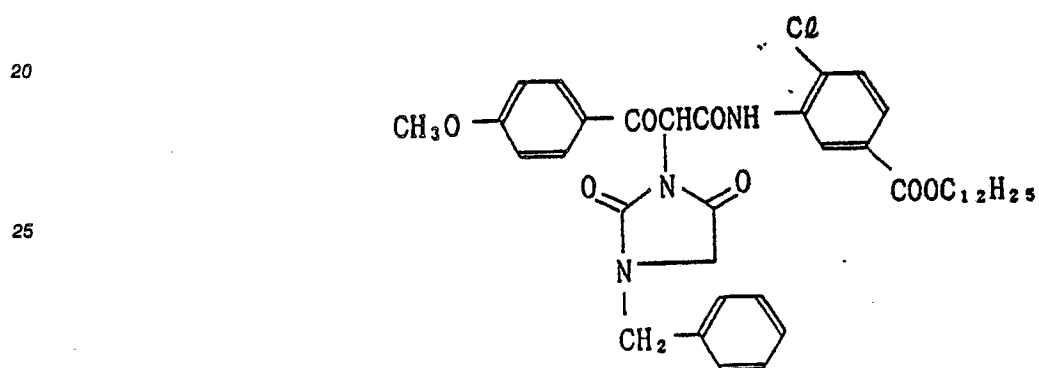
CC-1



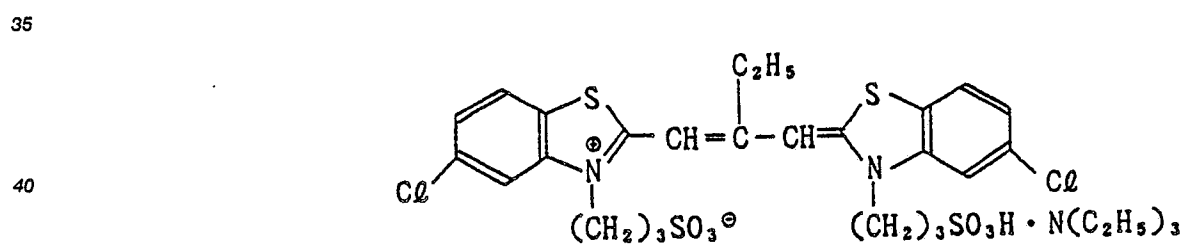
CM-1



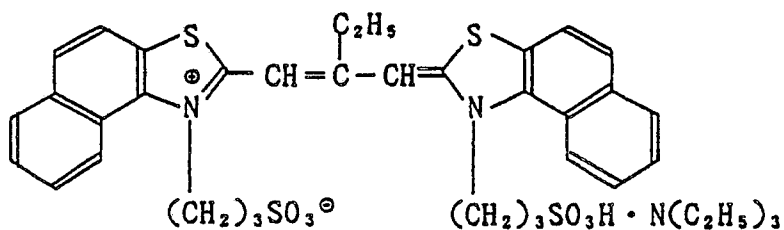
Y-1



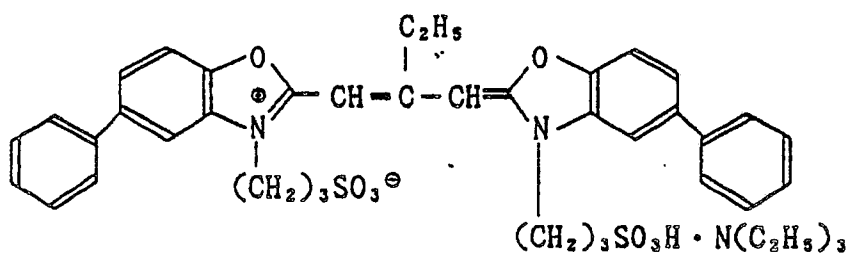
Sensitizing dye I



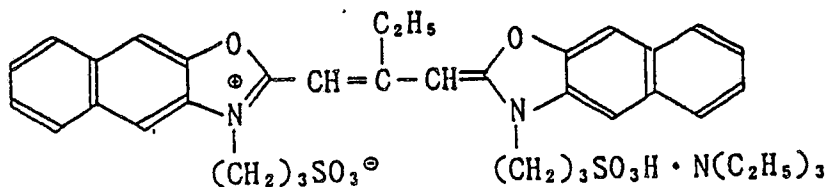
Sensitizing dye II



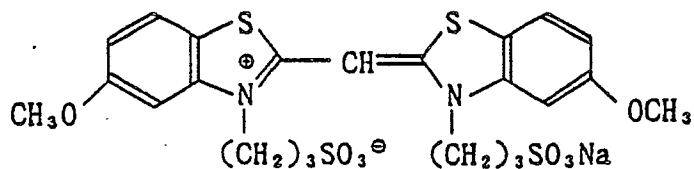
Sensitizing dye III



Sensitizing dye IV



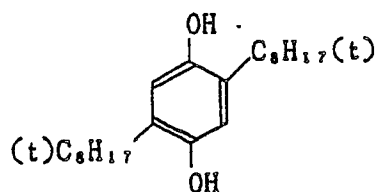
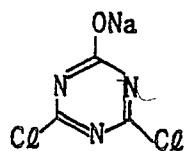
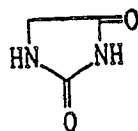
Sensitizing dye V



HS-1

H-1

AS-1



The above component layers will be shown hereinafter in abbreviations HC, IL-1, R-1, R-2, IL-2, G-1, G-2, YC, B-1, B-2, Pro-1 and Pro-2, which were given in the above table.

5 Preparation of samples Nos. 102 to 105 (comparative)

These samples were prepared in the same manner as in sample No.101 except that the couplers contained in the G-1 and G-2 of sample No.101 were replaced as shown in Table 3.

10

Preparation of samples Nos.106 to 110

These samples were prepared in the same manner as in sample No.101 except that the G-2 was removed and the couplers contained in the G-1 were replaced as shown in Table 3.

15

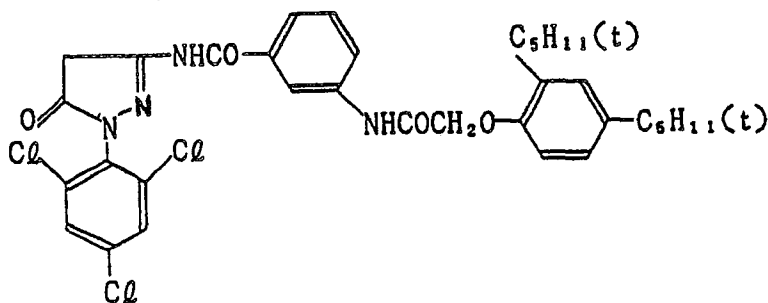
Table 3

Emulsion No.	Number of green-sensitive layers	Coupler in green-sensitive layer	Remarks
101	2	Exemplified cpd. 4	Comparative
102	2	" 9	"
103	2	" 2	"
104	2	" 52	"
105	2	Comparative cpd. A	"
106	1	Exemplified cpd. 4	Invention
107	1	" 9	"
108	1	" 2	"
109	1	" 52	"
110	1	Comparative cpd. A	Comparative

35

Comparative coupler A (conventional coupler)

40



45

50

The formalin resistance and preservability of these obtained samples were evaluated.

<Evaluation of formalin resistance>

55

Each sample was divided into two parts; one part was allowed to stand for 3 days in a desiccator of which the inside atmosphere was kept at 35°C and a relative humidity of 65% by an aqueous solution containing 4 ml of 50-fold diluted formalin, into which a saturated amount of cobalt chloride was dissolved,

and the other part was allowed to stand likewise in a desiccator conditioned in quite the same way except that the formalin was excluded (for comparative standing).

After that, both parts of each sample were exposed through an optical wedge in usual manner and then processed in the following steps. The formalin resistance is expressed by the following value: Formaline resistance = the density of one part that was allowed to stand under the formaline condition by an exposure amount that gives a density of 1.0 of the other part under the comparative standing condition.

Each sample was evaluated for its formalin resistance, and the rate of the formalin resistance improving effect of the invention was expressed by the following formula:

Formaline resistance improving effect

$$= \frac{\text{formalin resistance when using coupler of the invention}}{\text{formalin resistance when using comparative coupler A}}$$

The results are shown in Table 4

Processing steps: at 38 ° C	
Color developing	3 minutes and 15 seconds
Bleaching	6 minutes and 30 seconds
Washing	3 minutes and 30 seconds
Fixing	6 minutes and 30 seconds
Washing	3 minutes and 30 seconds
Stabilizing	1 minute and 30 seconds
Drying	

The compositions of the processing baths that were used in the above steps are as follows:

Color developer :	
4-Amino-3-methyl-N-ethyl-N-(β -hydroxyethyl)aniline sulfate	4.75g
Anhydrous sodium sulfite	4.25g
Hydroxylamine 1/2 sulfate	2.0 g
Anhydrous potassium carbonate	37.5 g
Potassium bromide	1.3 g
Trisodium nitrilotriacetate, monohydrated	2.5 g
Potassium hydroxide	1.0 g
Water to make 1 liter.	

Bleaching bath :	
Ferric-ammonium ethylenediaminetetraacetate	100.0 g
Diammonium ethylenediaminetetraacetate	10.0 g
Ammonium bromide	150.0 g
Glacial acetic acid	10.0 g
Water to make 1 liter. Adjust pH to 6.0 by aqueous ammonia.	

Fixer :	
Ammonium thiosulfate	175.0 g
Anhydrous ammonium sulfite	8.6 g
Sodium metarsulfite	2.3 g
Water to make 1 liter. Adjust pH to 6.0 by acetic acid.	

Stabilizer bath :	
Formalin (37% solution)	1.5 ml
Koniducks (product of KONICA Corporation)	7.5 ml

Table 4

Compared samples	Formalin resistance improving effect
No.101 / No.105	2.3
No.102 / No.105	2.1
No.103 / No.105	2.2
No.104 / No.105	2.5
No.106 / No.110	6.8
No.107 / No.110	7.2
No.108 / No.110	8.2
No.109 / No.110	7.3

As is apparent from Table 4, the samples Nos.106 through 109 for the invention are excellent in the formalin resistance improving effect.

That is, where the green-sensitive layer is of a double-layer construction, the formalin resistance improving effect when a magenta coupler of the invention is used is about two or three times larger than that when a comparative coupler was used, whereas where the green-sensitive layer of the invention is of a single-layer construction, the formalin resistance improving effect is as significantly improved as 6 times to 9 times larger.

Subsequently, the preservability with time was evaluated.

<Evaluation of preservability>

Difference between the sensitivity immediately after preparation and the sensitivity after standing for 7 days at 40°C/80% RH of each sample was shown in a relative value to the samples No.105's and No.110's sensitivities difference regarded as 100 obtained when the samples were allowed to stand for 7 days under the same conditions. The smaller the value, the better the preservability.

The results are shown in Table 5.

Table 5

Sample No.	Preservability
101 (comparative)	87
102 (")	88
103 (")	86
104 (")	86
105 (")	100
106 (invention)	78
107 (")	81
108 (")	80
109 (")	83
110 (comparative)	100

As is apparent from Table 5, the preservability of the samples Nos.106 through 109 is significantly improved. The improving effect is one totally beyond our expectation from both the improving effect of the green-sensitive layer and that of the coupler of the invention. The samples for the invention, since its green-sensitive layer is of a single layer construction, is excellent in the sharpness as well as in the processing stability.

As has been mentioned above, the silver halide color photographic light-sensitive material that satisfies the construction requirements of the invention is significantly improved in the formalin resistance and excellent in the preservability.

Also, the sample prepared in the same manner as in sample No.106 for the invention except that the Em-2 in the G-1 of sample No.106 was replaced by an equimolar mixture of emulsions Em-2 and Em-A is preferably because it has an exposure latitude 40% wider than that of sample No.106. Further, the sample prepared in the same manner as in the above sample except that the Em-2 and Em-A contained in the above sample were replaced by an emulsion prepared by mixing Em-1 and Em-2 in a molar ratio of 3:7 is so improved in the processing stability that it has a 50% less change in the sensitivity due to the change in pH of the processing solution.

That is, the use of an emulsion partially comprising silver halide grains containing a desensitizer in the inside thereof for the light-sensitive layer of a single layer construction makes possible not only to obtain a wide exposure latitude in spite of the small coefficient of variation of the grain size of the silver halide contained in the light-sensitive layer but also to improve the processing stability, thus being a preferred embodiment of the present invention.

Further, the sample having blue-sensitive and green-sensitive layers each being of a single-layer construction prepared in the same manner as in sample No.106 except that the B-2 of sample No.106 is removed and the Em-2 contained in the B-1 is replaced by an emulsion in an equimolar mixture of Em-2 and Em-A, and the sample having blue-sensitive and green-sensitive layers each being of a single-layer construction prepared in the same manner except that the Em-2 and Em-A mentioned above were replaced by an emulsion prepared by mixing Em-1 and Em-2 in a molar ratio of 3:7 are also found to have the same tendency as the above with respect to the exposure latitude and processing stability, and at the same time, to have even more improved sharpness.

Furthermore, even in the sample comprising blue-sensitive, green-sensitive and red-sensitive layers all being of single-layer constructions, the same tendency as the above is recognized, which is a particularly preferred embodiment of the present invention.

EXAMPLE 2

A silver iodobromide emulsion having an average AgI content of 8.5 mole% and an average grain size of 0.7 μ m was prepared in making reference to the foregoing preparation method, in which the AgI content is higher in the inside of the grain and seed emulsion is NE-1. The obtained emulsion was regarded as Em-B.

Sample No.201 was prepared in the same manner as in sample No.101 in Example 1.

Sample No.202 was prepared in the same manner as in sample No.201 except that the G-2 was removed and the Em-2 contained in the G-1 of sample No.201 was replaced by an equimolar mixture of emulsions Em-2 and Em-A.

Sample No.203 was prepared in the same manner as in sample No.201 except that the G-2 was removed and the Em-2 contained in the G-1 of sample No.201 was replaced by an equimolar mixture of emulsions Em-A and Em-B.

The obtained sample was exposed and processed in the same manner as in Example 1. Subsequently, the preservability with time and the exposure latitude were evaluated. The results are listed in Table 6.

Table 6

Sample No.	Number of green-sensitive layers	Exposure latitude (green)	Preservability	Remarks
201	2	3.2	100	Comparative
202	1	3.4	55	Invention
203	1	3.2	75	Invention

As is apparent from Table 6, the preservability of the samples Nos. 202 and 203 in this invention is significantly improved.

EXAMPLE 3

Sample No.301 was prepared in the same manner as in sample No.101 in Example 1 except that the R-2 and B-2 were removed and the Em-2 contained in the R-1 was replaced by an equimolar mixture of emulsions Em-A and Em-2, and the Em-2 contained in the B-1 was replaced by an equimolar mixture of emulsions Em-A and Em-2.

Sample No.302 was prepared in the same manner as in sample No.301 except that the G-2 was removed and the Em-2 contained in the G-1 of sample No.301 was replaced by an equimolar mixture of emulsions Em-2 and Em-A.

Sample No.303 was prepared in the same manner as in sample No.301 except that the G-2 was removed and the Em-2 contained in the G-1 of sample No.301 was replaced by an equimolar mixture of emulsions Em-A and Em-B.

The obtained sample was exposed, processed and evaluated in the same manner as in Example 2. The results are listed in Table 7.

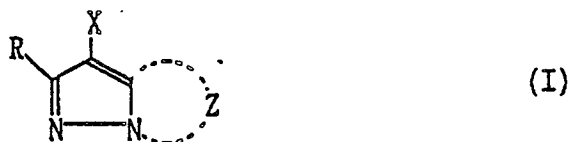
Table 7

Sample No.	Number of green-sensitive layers	Exposure latitude (green)	Preservability	Remarks
301	2	3.2	100	Comparative
302	1	3.4	35	Invention
303	1	3.2	50	Invention

As is apparent from Table 7, the preservability of the samples Nos. 302 and 303 in this invention is significantly improved.

Claims

1. A silver halide color photographic light-sensitive material for making color negatives comprising a support having thereon a blue-sensitive silver halide emulsion layer, a green-sensitive silver halide emulsion layer and a red-sensitive silver halide emulsion layer, wherein said green-sensitive silver halide emulsion layer is comprised of a single layer containing a DIR compound and a magenta coupler represented by Formula I:



wherein Z represents a group of nonmetallic atoms necessary to form a nitrogen-containing heterocyclic ring, provided that the ring formed by Z may have a substituent: X is a hydrogen atom or a substituent capable of being split off upon reaction with the oxidation product of a color developing agent; and R is a hydrogen atom or a substituent.

2. The material of claim 1, wherein said blue-sensitive emulsion layer is comprised of a single layer.

3. The material of claim 2, wherein said red-sensitive emulsion layer is comprised of a single layer.

4. The material of claim 1, wherein said green-sensitive emulsion layer contains at least two silver halide emulsions having different average grain size from each other.

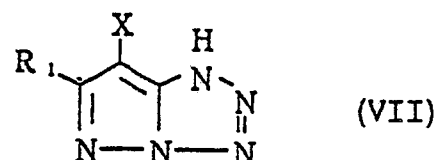
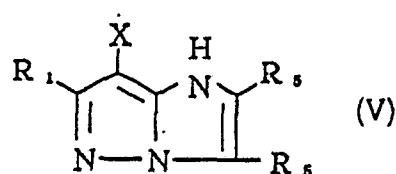
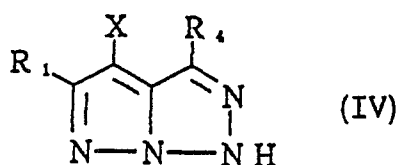
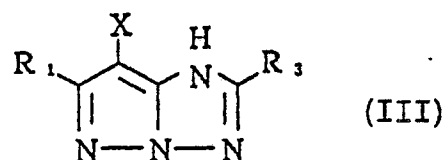
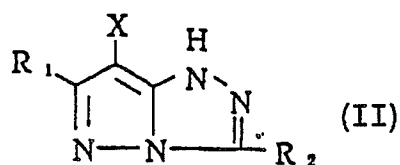
5. The material of claim 4, wherein an average grain size of a silver halide emulsions having the largest average grain size among said at least two silver halide emulsions is within the range of from 0.2 μ m to 2.0 μ m and an average grain size of a silver halide emulsion having the smallest average grain size among said at least two silver halide emulsions is within the range of from 0.05 μ m to 1.0 μ m.

6. The material of claim 4, wherein an average grain size of a silver halide emulsion having the largest average grain size among said at least two silver halide emulsions is 1.5 to 40 times larger than that of a silver halide emulsion having the smallest average grain size among said at least two silver halide emulsions.

7. The material of claim 1, wherein a part of silver halide grains contained in said green-sensitive emulsion layer contains a desensitizer.

8. The material of claim 7, wherein said desensitizer is a rhodium compound.

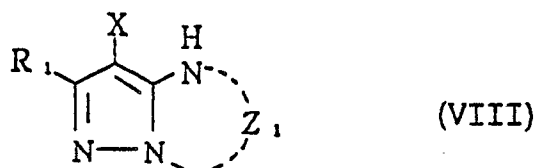
9. The material of claim 1, wherein said magenta coupler is represented by Formula II, III, IV, V, VI or VII:



wherein R_1 through R_8 and X are as defined for said R and X , respectively.

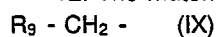
10. The material of claim 9, wherein said magenta coupler is represented by the above Formula II.

11. The material of claim 1, wherein said magenta coupler is represented by Formula VIII:



wherein R_1 , X and Z_1 are as defined for said R , X and Z respectively.

12. The material of claim 1, wherein said R is a group represented by the following Formula IX:

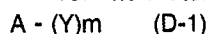


wherein R_9 is defined as said R .

13. The material of claim 1, wherein said X is a chlorine atom.

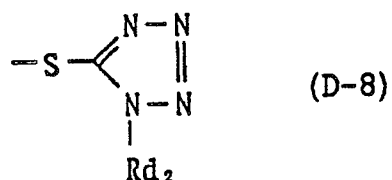
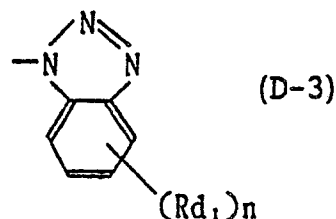
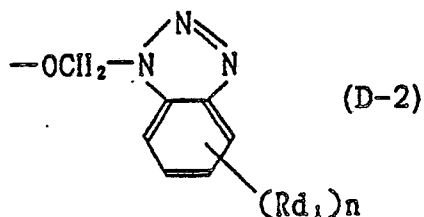
14. The material of claim 1, wherein said magenta coupler is contained in said green-sensitive emulsion layer in an amount of from 1×10^{-2} to 8×10^{-1} mol per mol of silver halide contained said greensensitive emulsion layer.

15. The material of claim 1, wherein said DIR compound is represented by Formula D-1:



wherein A is a coupler residue; Y is a group being a development inhibitor or a group capable of releasing a developing inhibitor which is combined to the coupling position of said coupler residue A and said Y is capable of splitting off upon reaction with the oxidation product of a color developing agent; and m is an integer of 1 or 2.

16. The material of claim 15, wherein said Y is a group represented by Formula D-2, D-3 or D-8:



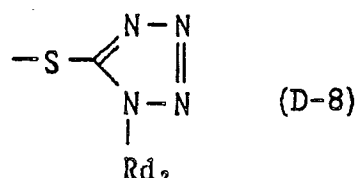
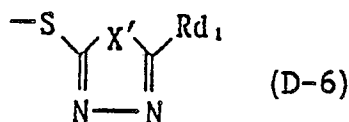
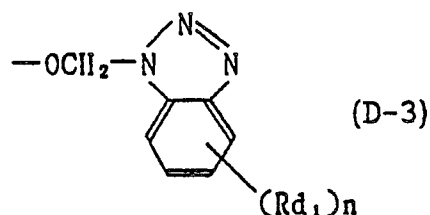
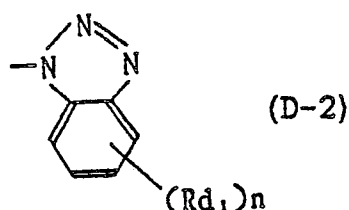
Wherein Rd_1 is a hydrogen atom, a halogen atom, an alkyl group, an alkoxy group, an acylamino group, an alkoxy carbonyl group, a thiazolidinylideneamino group, an aryloxy carbonyl group, an acyloxy group, a carbamoyl group, an N-alkylcarbamoyl group, an N,N-dialkylcarbamoyl group, a nitro group, an amino group, an N-arylcarbamoyloxy group, a sulfamoyl group, an N-alkylcarbamoyloxy group, a hydroxy group, an alkoxy carbamoyl-amino group, an alkylthio group, an arylthio group, an aryl group, a heterocyclic group, a cyano group, an alkylsulfonyl group or aryloxy carbonylamino group and n is an integer of 0, 1 or 2, provided that when n is 2, said Rd_1 may be either the same as or different from each other and total number of the carbon atoms contained in the n number of Rd_1 s are from zero to 10; Rd_2 is an alkyl group, an aryl group or a heterocyclic group.

17. The material of claim 15, wherein said Y is a group represented by Formula D-10:

- (TIME) $_n$ - INHIBIT (D-10)

wherein -TIME- is a group being combined to the coupling position of said coupler residue A and capable of being split off upon reaction with the oxidation product of a color developing agent and capable of being split off INHIBIT after split off from said coupler residue and INHIBIT is a development inhibitor.

18. The material of claim 17, wherein said -INHIBIT is a group represented by Formula D-2, D-3, D-6 or D-8:



Wherein Rd_1 is a hydrogen atom, a halogen atom, an alkyl group, an alkoxy group, an acylamino group, an alkoxy carbonyl group, a thiazolidinylideneamino group, an aryloxy carbonyl group, an acyloxy group, a carbamoyl group, an N-alkylcarbamoyl group, an N,N-dialkylcarbamoyl group, a nitro group, an amino group, an N-arylcarbamoyloxy group, a sulfamoyl group, an N-alkylcarbamoyloxy group, a hydroxy group, an alkoxy carbamoyl-amino group, an alkylthio group, an arylthio group, an aryl group, a heterocyclic group, a cyano group, an alkylsulfonyl group or aryloxy carbonylamino group and n is an integer of 0, 1 or 2,

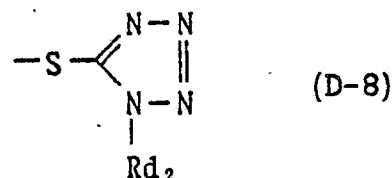
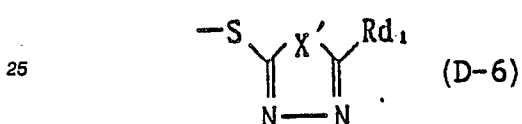
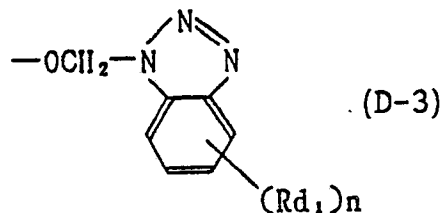
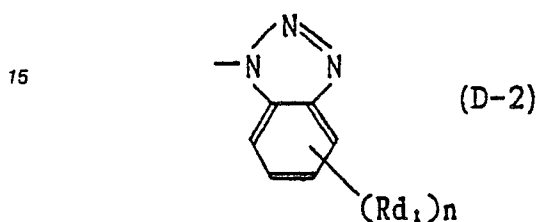
provided that when n is 2, said Rd_1 may be either the same as or different from each other and total number of the carbon atoms contained in the n number of Rd_1 s are from zero to 10; Rd_2 is an alkyl group, an aryl group or a heterocyclic group; and X' is an oxygen atom or a sulfur atom.

19. The material of claim 15, wherein said Y is a group represented by Formula D-20:

5 - $(T_1)_l - SR - (T_2)_{m'} - INHIBIT$ (D-20)

wherein T_1 is a component capable of splitting of the $SR - (T_2)_{m'} - INHIBIT$; SR is a component capable of producing a $(T_2)_{m'} - INHIBIT$ by reaction with the oxidation product of a color developing agent after $SR - (T_2)_{m'} - INHIBIT$ is split off; T_2 is a component capable of splitting off a $INHIBIT'$ after $(T_2)_{m'} - INHIBIT'$ is produced; $INHIBIT$ is a development inhibitor; and l and m' are each an integer of zero or 1.

10 20. The material of claim 19, wherein said $-INHIBIT$ is a group represented by Formula D-2, D-3, D-6 or D-8:



30 Wherein Rd_1 is a hydrogen atom, a halogen atom, an alkyl group, an alkoxy group, an acylamino group, an alkoxycarbonyl group, a thiazolidinylideneamino group, an aryloxycarbonyl group, an acyloxy group, a carbamoyl group, an N-alkylcarbamoyl group, an N,N-dialkylcarbamoyl group, a nitro group, an amino group, an N-arylcarbamoyloxy group, a sulfamoyl group, an N-alkylcarbamoyloxy group, a hydroxy group, an alkoxycarbamoyl-amino group, an alkylthio group, an arylthio group, an aryl group, a heterocyclic group, a cyano group, an alkylsulfonyl group or aryloxycarbonylamino group and n is an integer of 0, 1 or 2, provided that when n is 2, said Rd_1 may be either the same as or different from each other and total number of the carbon atoms contained in the n number of Rd_1 s are from zero to 10; Rd_2 is an alkyl group, an aryl group or a heterocyclic group; and X' is an oxygen atom or a sulfur atom.