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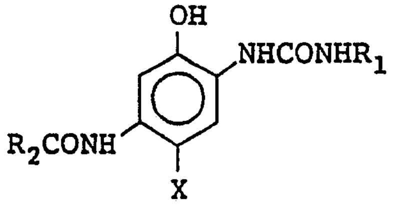
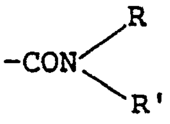
# (54) Silver halide color photographic material.

(57) A silver halide color photographic material comprising at least one blue-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one red-sensitive silver halide emulsion layer on a support, wherein at least 10 layers comprising at least one of the silver halide emulsion layers are coated simultaneously in one operation, and i) said at least one red-sensitive silver halide emulsion layer contains at least one cyan coupler represented by general formula (I):



(I)

wherein X represents a hydrogen atom or a group capable of being released upon coupling with an oxidation product of an aromatic primary amine color developing agent; $R_1$ represents a naphthyl group, a heterocyclic group with the proviso that a nitrogen atom in the ureido group is connected to a carbon atom in the heterocyclic group, or $R_1$ represents a phenyl group containing at least one substituent selected from the group consisting of a trifluoromethyl group, a nitro group, a cyano group, an alkyl group, an aryl group, a halogen atom, an amino group, a hydroxy group, -COR, -COOR, -$SO_2$R, -$SO_2$OR,



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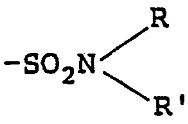

,

-OR, -OCOR,

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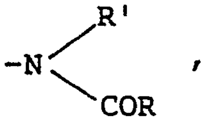
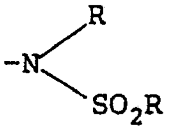


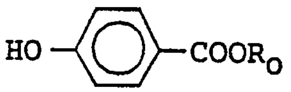
$-N(R')COR$ ,

and



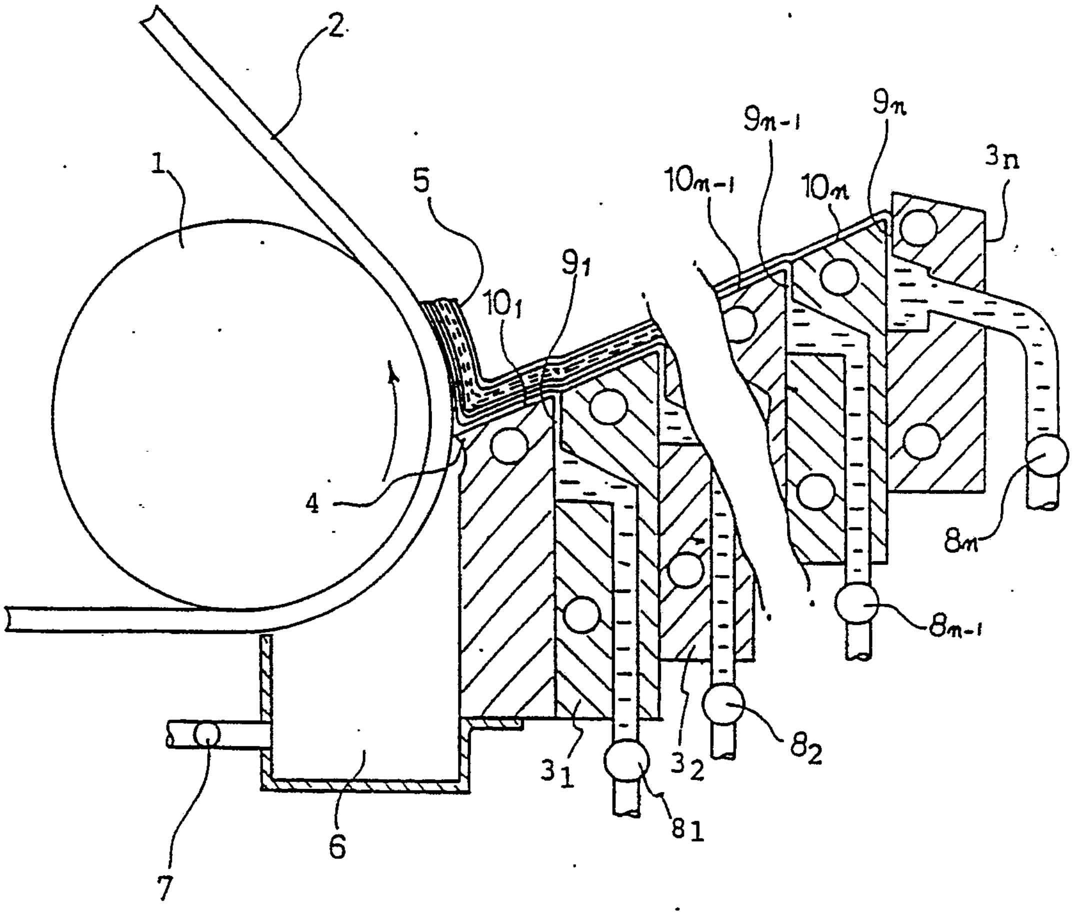
$-N(R)SO_2R$

(in which R represents an alkyl group or an aryl group, R'represents a hydrogen atom, an alkyl group or an aryl group, and R and R' may be connected to each other to form a ring), with the proviso that if a cyano group is present on the phenyl group in the p-position with respect to the ureido group, the phenyl group does not contain hydrogen atoms in four positions of o-positions and m-positions at the same time; and $R_2$ represents an alkyl group or an aryl group required to render a cyan coupler represented by the general formula (I) and a cyan dye produced therefrom nondiffusive; ii) and/or at least one layer contains at least one compound represented by the general formula (II):



(II)

wherein $R_0$ represents a $C_{1-5}$ alkyl group.



## FIELD OF THE INVENTION

The present invention relates to a silver halide color photographic material. More particularly, the present invention relates to a silver halide color photographic material which provides an improved face quality upon simultaneous multilayer coating.

## BACKGROUND OF THE INVENTION

It is a recent tendency that as color photographic light-sensitive materials attain higher picture quality, color photographs are printed in larger sizes than ever. For example, 89 mm x 127 mm size prints have become popular in addition to 83 mm x 117 mm size prints. Further, sexpartite, quarter and full sizes have become popular. Accordingly, the demand for surface uniformity on color photographic light-sensitive materials has grown more and more. Thus, the occurrence of any small nonuniformity or minute foreign matters is not allowable.

Examples of approaches for improving the uniformity of the coating surface of photographic light-sensitive materials include a method as disclosed in JP-A-52-115214 (corresponding to U.S. Patent 4,001,024; the term "JP-A" as used herein means an "unexamined published Japanese patent application") which comprises coating a coating composition having a relatively low viscosity of about 1 to 8 cp to a small thickness to form a lowermost layer, and coating a coating composition having a relatively high viscosity of about 10 to 100 cp to form a layer adjacent to the lowermost layer, and a method as disclosed in JP-A-63-11934 which comprises coating a hydrophilic colloid solution containing a high molecular weight compound having side chains which contain a sulfonic group, a sulfuric ester group or a carboxylic group and having an intrinsic viscosity number of 0.4 to 1.8 dl/g at a rate of 80 to 300 m/minute to form a lowermost layer. However, if 10 or more layers are simultaneously multi-coated, the above mentioned approaches leave much to be desired in obtaining a fully uniform surface. In particular, if a naphthol cyan coupler as commonly used in a red-sensitive emulsion layer in high sensitivity color negative light-sensitive materials or a phenol, which is mostly widely used as a preservative for ordinary color light-sensitive materials, is used, the ageing due to retention during preparation causes deterioration in the physical properties of coating solutions, resulting in clogging in filters at the coating process, deterioration in the uniformity of the surface of the products, and occurrence of foreign matters on the coating surface.

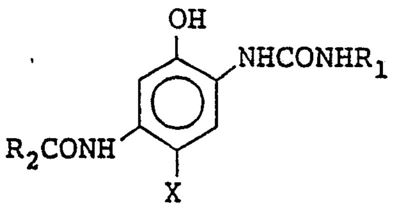
If 10 or more layers are simultaneously coated, it is required to prepare 10 or more coating solutions at the same time, and this prolongs the retention ageing of these coating solutions. The term "retention ageing of coating solutions" as used herein means a "time between the completion of the preparation and the beginning of the coating of the coating solutions". If 10 or more layers are coated in two or more processing, it not only deteriorates the working efficiency but also requires that alkali-soluble polymer grains or a surface active agent which may deteriorate the properties of the product be incorporated in the uppermost layer during coating as described in JP-A-63-89847.

## SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a color photographic light-sensitive material which provides an excellent uniformity of the surface of the product.

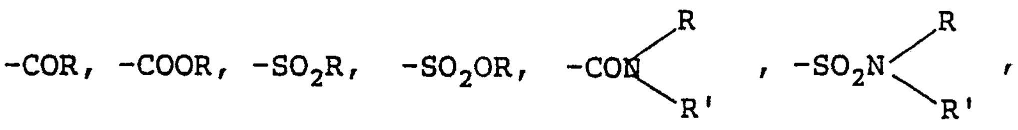
The above and other objects of the present invention will become more apparent from the following detailed description and examples.

The object of the present invention is accomplished with a silver halide color photographic material comprising at least one blue-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one red-sensitive silver halide emulsion layer on a support, wherein at least 10 layers comprising at least one of the silver halide emulsion layers are coated simultaneously in one operation on the support, and the red-sensitive silver halide emulsion layer contains at least one cyan coupler represented by the general formula (I):

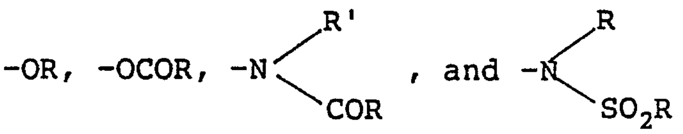


(I)

wherein X represents a hydrogen atom or a group capable of being released from upon coupling with an oxidation product of an aromatic primary amine color developing agent; $R_1$ represents a naphthyl group, a heterocyclic group with the proviso that a nitrogen atom in the ureido group is connected to a carbon atom in the heterocyclic group, or $R_1$ represents phenyl group having at least one substituent selected from the group consisting of a trifluoromethyl group, a nitro group, a cyano group, an alkyl group, an aryl group, a halogen atom, an amino group, a hydroxy group,



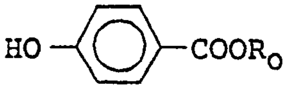
$$-COR,\ -COOR,\ -SO_2R,\ -SO_2OR,\ -CON\begin{matrix}R\\R'\end{matrix},\ -SO_2N\begin{matrix}R\\R'\end{matrix},$$



$$-OR,\ -OCOR,\ -N\begin{matrix}R'\\COR\end{matrix},\ \text{and}\ -N\begin{matrix}R\\SO_2R\end{matrix}$$

(in which R represents an alkyl group or an aryl group, R' represents a hydrogen atom, an alkyl group or an aryl group, and R and R' may be connected to each other to form a ring), with the proviso that if a cyano group is present on the phenyl group in the p-position with respect to the ureido group, the phenyl group does not contain hydrogen atoms in four positions, i.e., o-positions and m-positions at the same time; and $R_2$ represents an alkyl group or aryl group required to render a cyan coupler represented by the general formula (I) and a cyan dye produced therefrom nondiffusive.

The object of the present invention is also accomplished with a silver halide color photographic material comprising at least one blue-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one red-sensitive silver halide emulsion layer on a support, wherein at least 10 layers comprising at least one of the silver halide emulsion layers are coated simultaneously in one operation on the support, and at least one layer in the photographic material contains at least one compound represented by the general formula (II):



(II)

wherein $R_0$ represents a $C_{1-5}$ alkyl group.

## BRIEF DESCRIPTION OF THE DRAWING

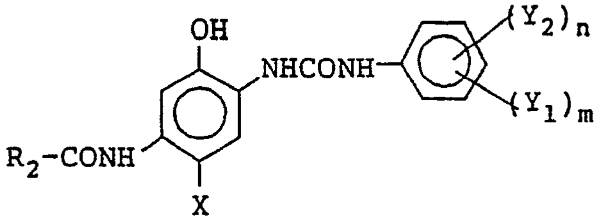
By way of example and to make the description more clear, reference is made to the accompanying drawing.

Figure shows a schematic side view of a slide hopper type coating apparatus which can be used in the practice of the present invention.

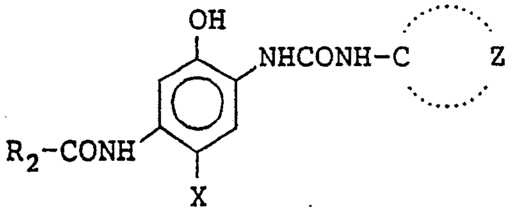
## DETAILED DESCRIPTION OF THE INVENTION

In the present invention "uniformity of the surface" means that the surface of the photographic material is uniform in the direction of the plane and there is no causing of precipitation of the coated component or forming of foams, lines and/or patches.

A cyan coupler of the general formula (I) which can be preferably used is particularly represented by the general formula (Ia) or (Ib):

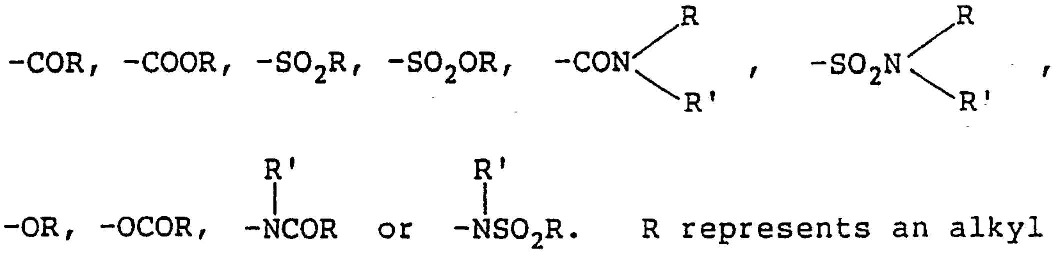


(Ia)



(Ib)

In general formulae (Ia) and (Ib), $Y_1$ represents a trifluoromethyl group, a nitro group, a cyano group,



$$-COR,\ -COOR,\ -SO_2R,\ -SO_2OR,\ -CON\begin{matrix}R\\R'\end{matrix},\ -SO_2N\begin{matrix}R\\R'\end{matrix},\ -OR,\ -OCOR,\ -\overset{R'}{\overset{|}{N}}COR \text{ or } -\overset{R'}{\overset{|}{N}}SO_2R.$$

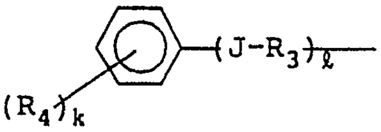
R represents an alkyl group (preferably a $C_{1-10}$ alkyl group (e.g., methyl, ethyl, butyl, benzyl)) or an aryl group (in the present invention an aryl group represents a naphthyl or phenyl group unless otherwise defined), preferably a phenyl group. R' represents a hydrogen atom or a group represented by R. R and R' may be connected to each other to form a ring, preferably a 5- to 8-membered ring and which may further contain at least one of N, O and S atoms.

$Y_2$ represents a monovalent group. Preferred examples of such a monovalent group include an alkyl group (preferably a $C_{1-10}$ alkyl group (e.g., methyl, t-butyl, ethoxyethyl, cyanomethyl)), an aryl group (preferably a phenyl group (e.g., phenyl, tolyl), naphthyl group), a halogen atom (e.g., fluorine, chlorine, bromine), an amino group (e.g., ethylamino, diethylamino), a hydroxyl group, and substituents represented by $Y_1$.

The suffix m represents an integer of 1 to 3, and the suffix n represents an integer of 0 to 3, with the proviso that m and n satisfy the relationship $m + n \leqq 5$, and if a cyan group is present on the phenyl group in the p-position with respect to the ureido group, m and n satisfy the relationship $2 \leqq m + n \leqq 5$.

Z represents a nonmetallic atom group required to form a heterocyclic group or naphthyl group. Preferred examples of such a heterocyclic group include 5- or 6-membered heterocyclic group containing 1 to 4 hetero atoms selected from N, O and S atoms, and the group may be condensed with a benzene ring. (In the present invention a heterocyclic group is defined in the same manner as done herein unless otherwise defined.) Specific examples of such a heterocyclic group include a furyl group, a thienyl group, a pyridyl group, a quinolyl group, ab oxazolyl group, a tetrazolyl group, a benzothiazolyl group, and a tetrahydrofuranyl group. Into these rings and the naphthyl group may be introduced any suitable substituents such as a $C_{1-10}$ alkyl group (e.g., ethyl, i-propyl, i-butyl, t-octyl), an aryl group (e.g., phenyl, naphthyl), a halogen atom (e.g., fluorine, chlorine, bromine), a cyano group, a nitro group, a sulfonamido group (e.g., methanesulfonamido, butanesulfonamido, p-toluenesulfonamido), a sulfamoyl group (e.g., methylsulfamoyl, phenylsulfamoyl), a sulfonyl group (e.g., methanesulfonyl, p-toluenesulfonyl), a fluorosulfonyl group, a carbamoyl group (e.g., dimethylcarbamoyl, phenylcarbamoyl), an oxycarbonyl group (e.g., ethoxycarbonyl, phenoxycarbonyl), an acyl group (e.g., acetyl, benzoyl), a heterocyclic group (e.g., pyridyl, pyrazolyl), an alkoxy group, and an aryloxy group.

$R_2$ represents an alkyl or aryl group required to render a cyan coupler represented by general formula (I) and a cyan dye produced therefrom nondiffusive. Preferred examples of such an alkyl or aryl group include a $C_{4-30}$ alkyl group, a phenyl group, and a group represented by the general formula [Ic]:


(Ic)

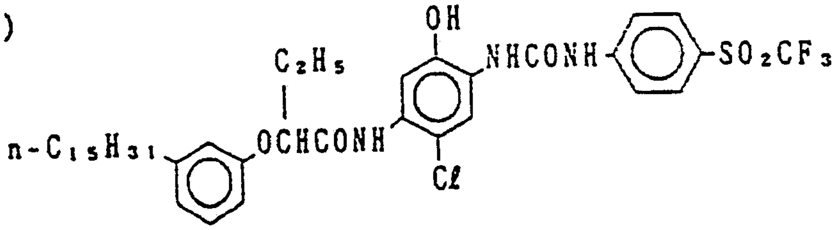
wherein J represents an oxygen atom or a sulfur atom; k represents an integer of 0 to 4 (when k is 2 or more, the two or more $R_4$'s may be the same or different); $\ell$ represents an integer 0 or 1; $R_3$ represents a $C_{1-20}$ straight-chain or branched alkylene group; and $R_4$ represents a monovalent group. Examples of such a monovalent group include a halogen atom (preferably chlorine, bromine), an alkyl group {preferably a straight-chain or branched $C_{1-20}$ alkyl group (e.g., methyl, tert-butyl, tert-pentyl, tert-octyl, dodecyl, pentadecyl, benzyl, phenethyl)}, an aryl group (e.g., phenyl), a heterocyclic group (preferably a nitrogen-containing heterocyclic group), an alkoxy group {preferably a straight-chain or branched $C_{1-20}$ alkyloxy group (e.g., methoxy, ethoxy, tert-butyloxy, octyloxy, decyloxy, dodecyloxy)}, an aryloxy group (e.g., phenoxy), a hydroxyl group, an acyloxy group {preferably an alkylcarbonyloxy group, an arylcarbonyloxy group (e.g., acetoxy, benzoyloxy)}, a carboxyl group, an alkoxycarbonyl group (preferably a $C_{1-20}$ straight-chain or branched alkyloxycarbonyl group), an aryloxycarbonyl group (preferably a phenoxycarbonyl), an alkylthio group (preferably a $C_{1-20}$ alkylthio group), an acyl group (preferably a $C_{1-20}$ straight-chain or branched alkylcarbonyl group), an acylamino group (preferably a $C_{1-20}$ straight-chain or branched alkylcarbonamido, benzenecarbonamido), a sulfonamido group (preferably a $C_{1-20}$ straight-chain or a branched alkylsulfonamido group, or a benzenesulfonamido group), a carbamoyl group (preferably a $C_{1-20}$ straight-chain or branched alkylaminocarbonyl group or phenylaminocarbonyl group), and a sulfamoyl group (preferably a $C_{1-20}$ straight-chain or branched alkylaminosulfonyl group, or phenylaminosulfonyl group).

X represents a hydrogen atom or a group capable of being released from the compound upon coupling with an oxidation product of a color developing agent. Examples of such a group include a halogen atom (e.g., chlorine, bromine, fluorine), a group having an oxygen or nitrogen atom directly bonded to the coupling position, such as an aryloxy group, a carbamoyloxy group, carbamoylmethoxy group, an acyloxy group, a sulfonamido group, and a succinic imido group. Specific examples of such a group include those described in U.S. Patent 3,741,563, JP-A-47-37425, JP-A-50-10135, JP-A-50-117422, JP-A-50-130441, JP-A-51-108841, JP-A-50-120334, JP-A-52-18315, and JP-A-53-105226, and JP-B-48-36894 (the term "JP-B" as used herein means an "examined Japanese patent publication").

The synthesis of cyan couplers of the present invention can be accomplished by methods as disclosed in U.S. Patent 3,758,308, and JP-A-56-65134.

Typical examples of such cyan couplers will be set forth below.

(1)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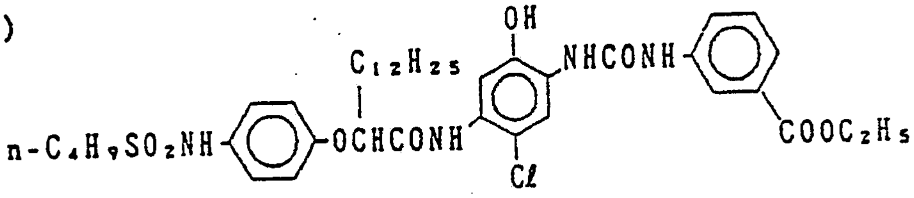
n-C₁₅H₃₁
OCHCONH
Cℓ

(2)


OH
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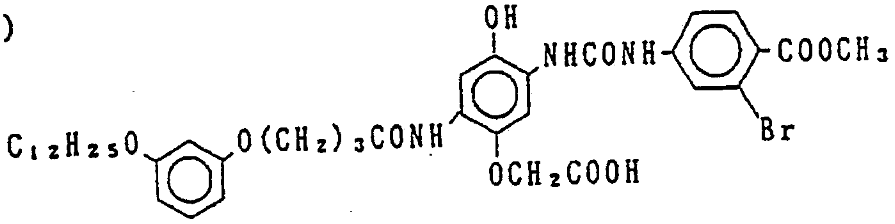
n-C₄H₉SO₂NH
OCHCONH
COOC₂H₅
Cℓ

(3)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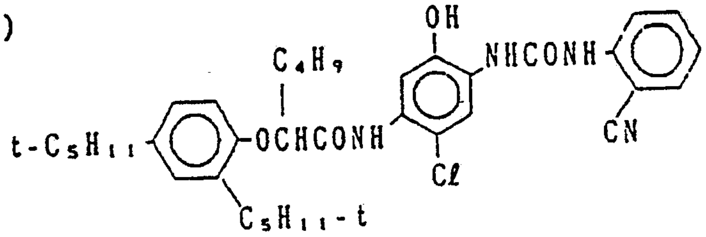
O(CH₂)₃CONH
Br
OCH₂COOH

(4)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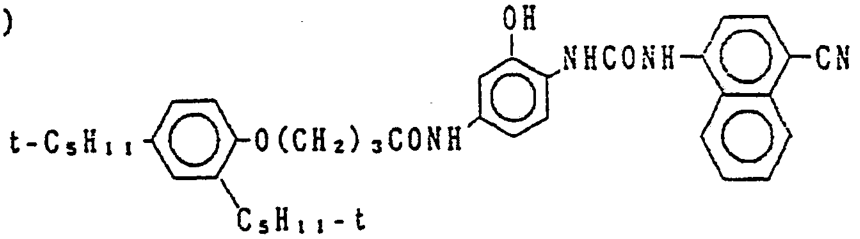
NHCONH
C₄H₉
t-C₅H₁₁
OCHCONH
CN
Cℓ
C₅H₁₁-t

(5)



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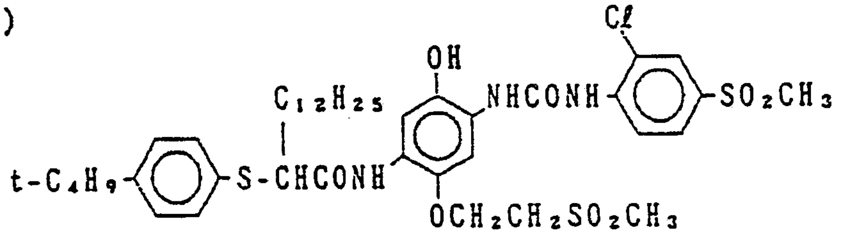

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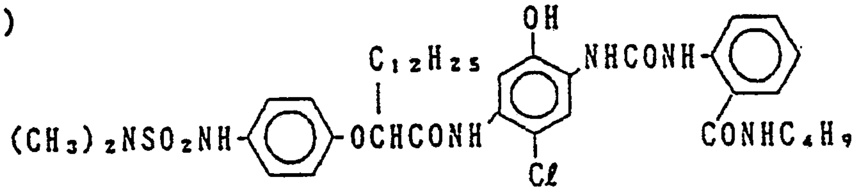

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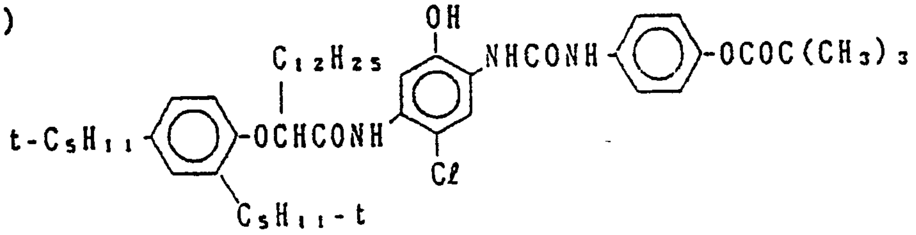

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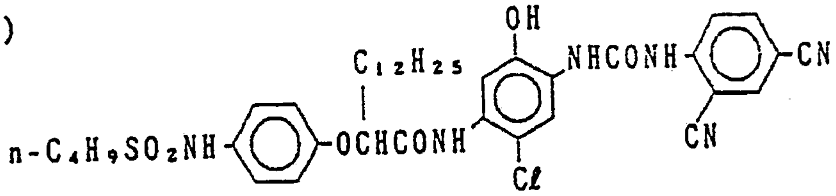

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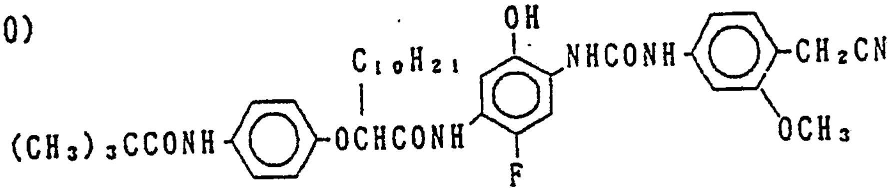

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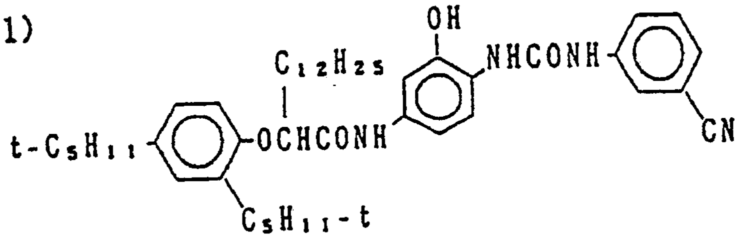

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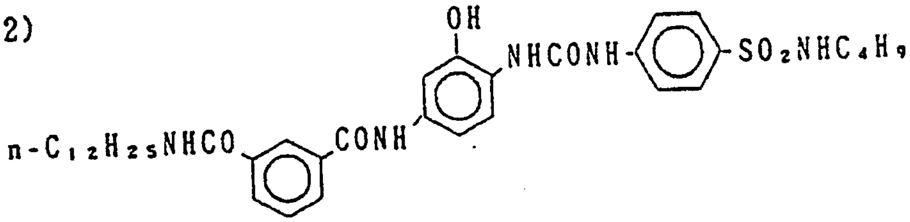

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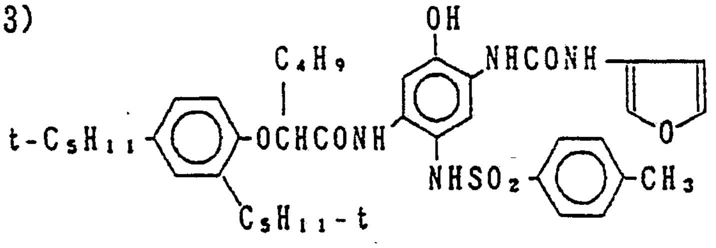

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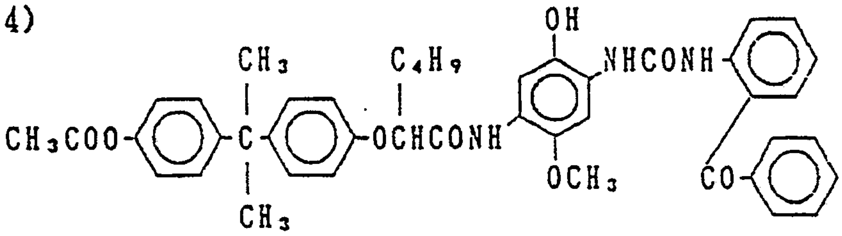

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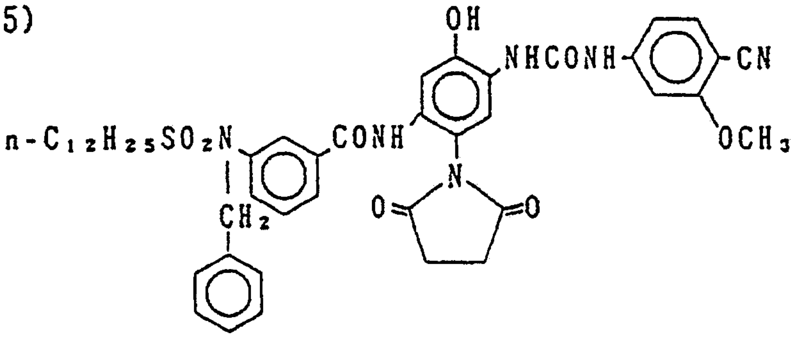

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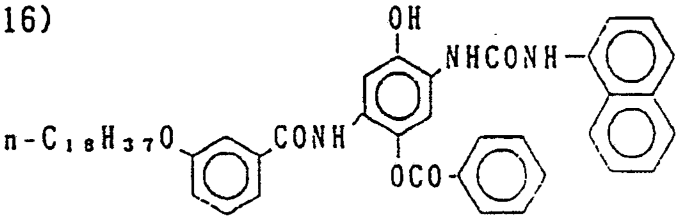

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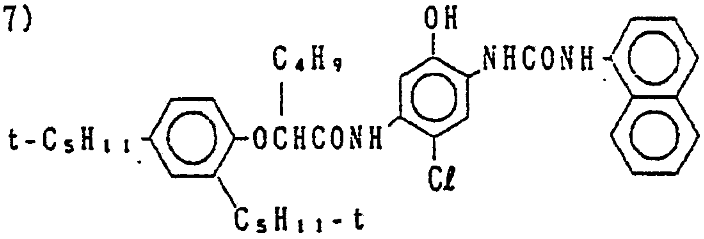
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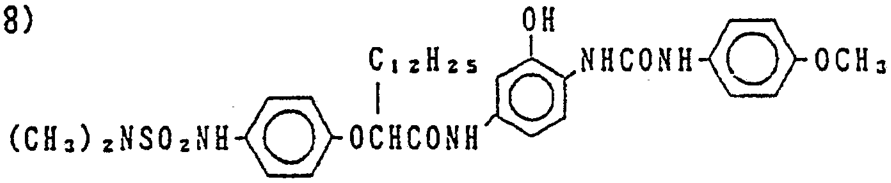
NHCONH
t-$C_5H_{11}$
OCHCONH
Cl
$C_5H_{11}$-t

(18)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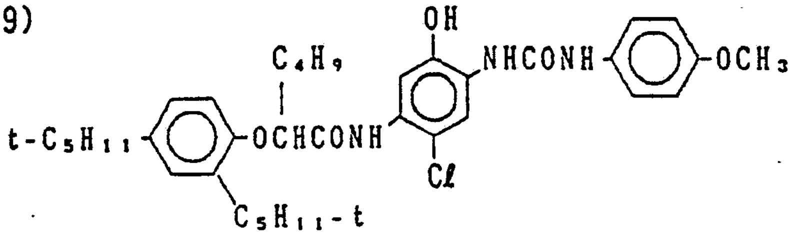
$C_{12}H_{25}$
NHCONH
$OCH_3$
$(CH_3)_2NSO_2NH$
OCHCONH

(19)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$OCH_3$
t-$C_5H_{11}$
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Cl
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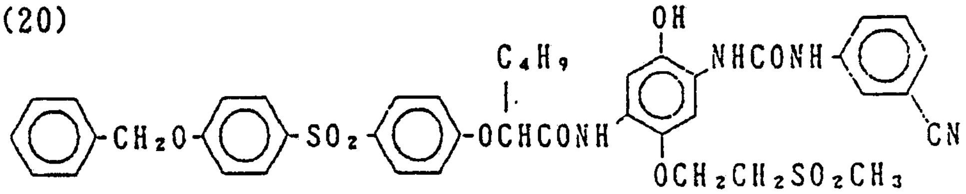
(20)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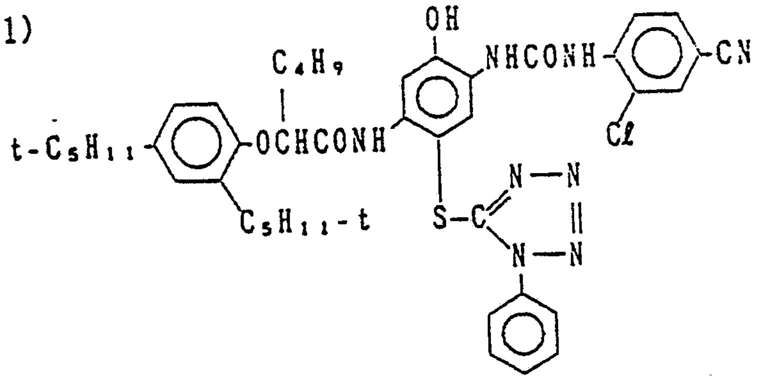
OCHCONH
CN
$OCH_2CH_2SO_2CH_3$

(21)



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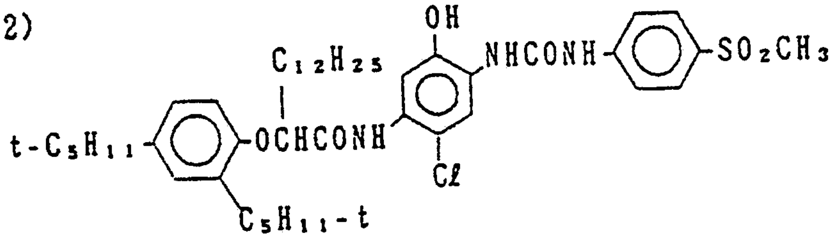

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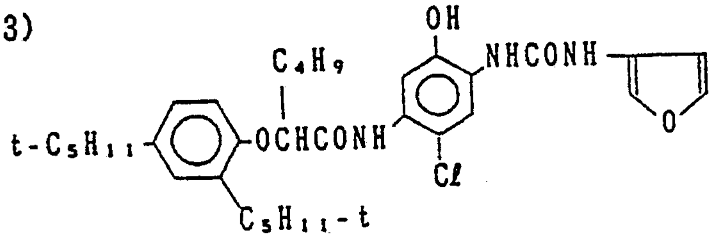

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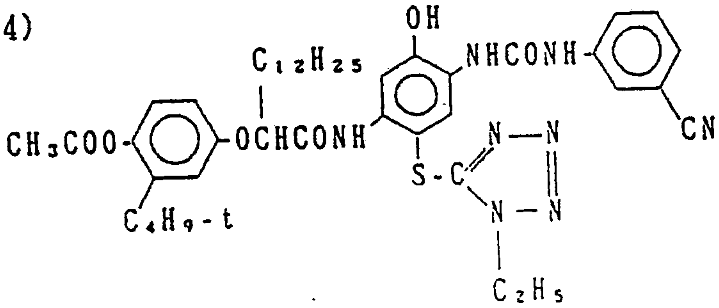

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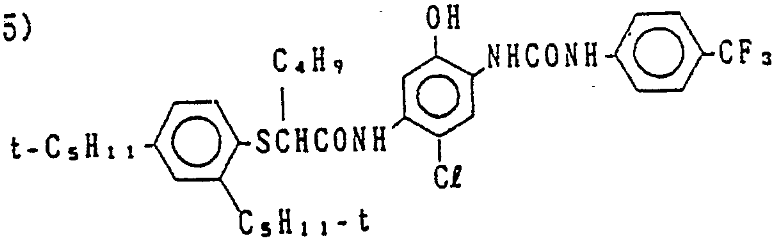
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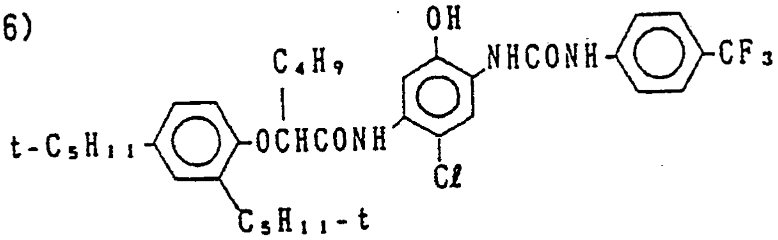
SCHCONH
Cℓ
C5H11-t

(26)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CF3
C4H9
t-C5H11
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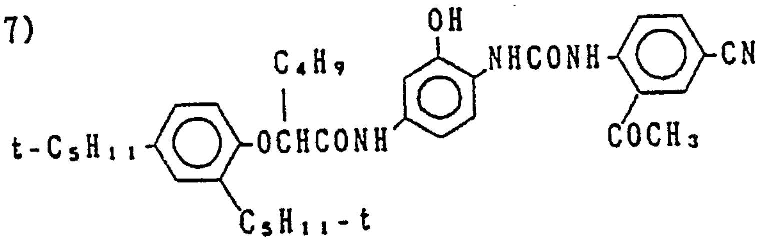
Cℓ
C5H11-t

(27)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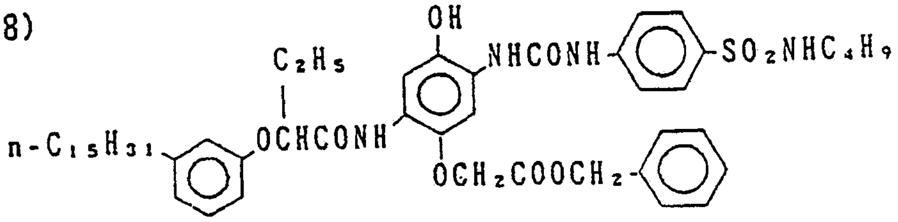
COCH3
C5H11-t

(28)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n-C15H31
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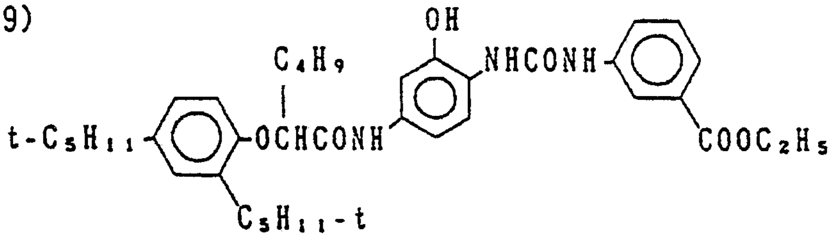
(29)



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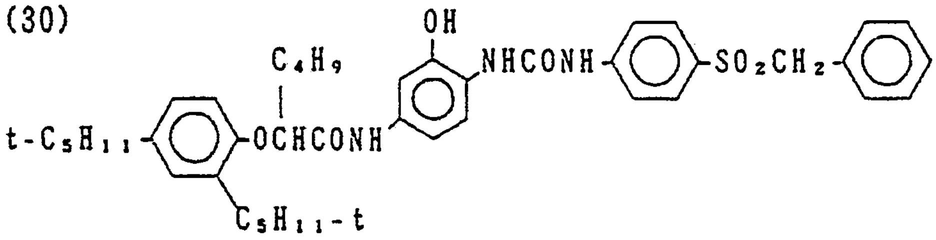

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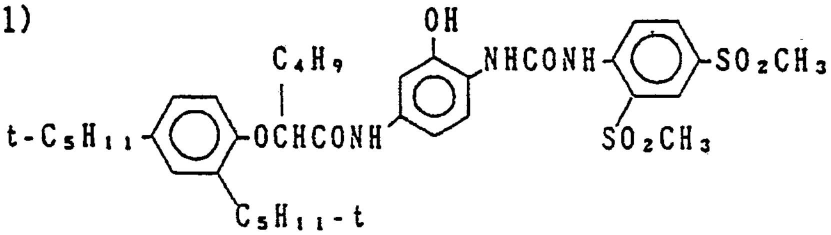

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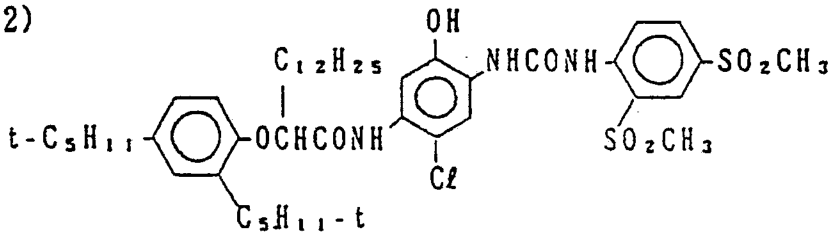

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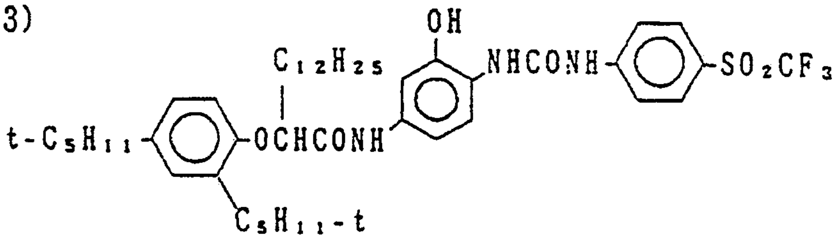
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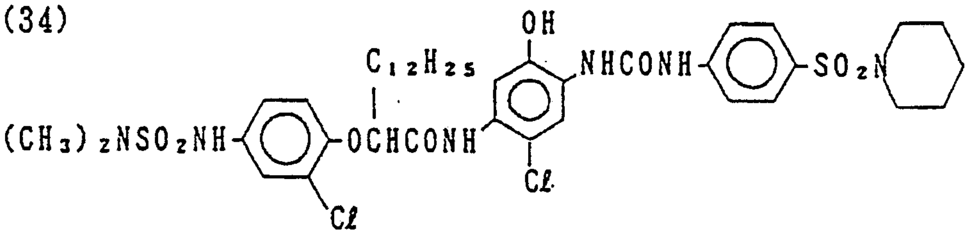
NHCONH
SO₂CF₃
t-C₅H₁₁
OCHCONH
C₅H₁₁-t

(34)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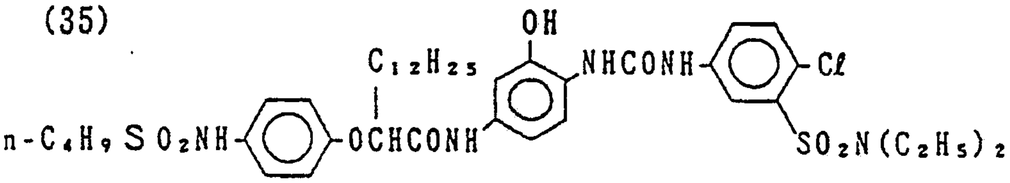
NHCONH
SO₂N
(CH₃)₂NSO₂NH
OCHCONH
Cℓ
Cℓ

(35)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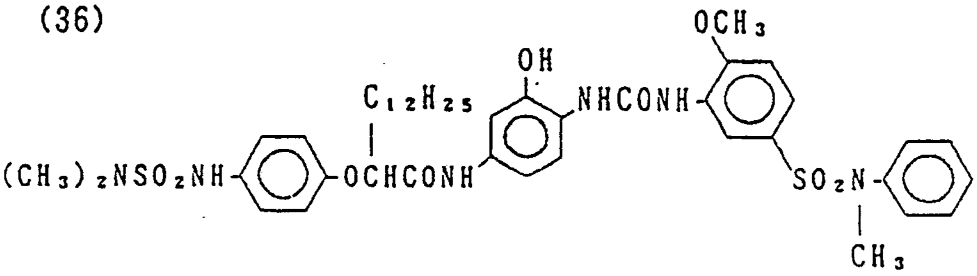
Cℓ
n-C₄H₉SO₂NH
OCHCONH
SO₂N(C₂H₅)₂

(36)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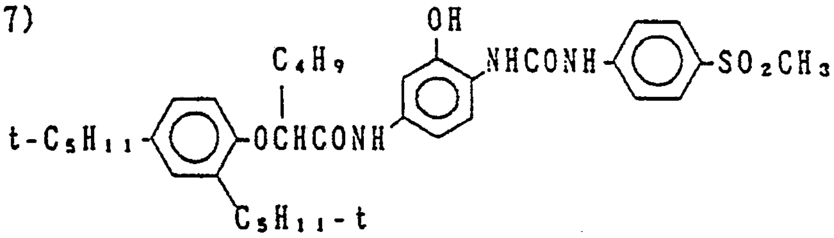
NHCONH
(CH₃)₂NSO₂NH
OCHCONH
SO₂N
CH₃

(37)



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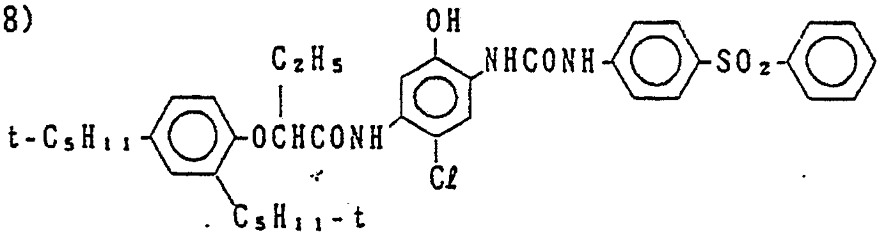

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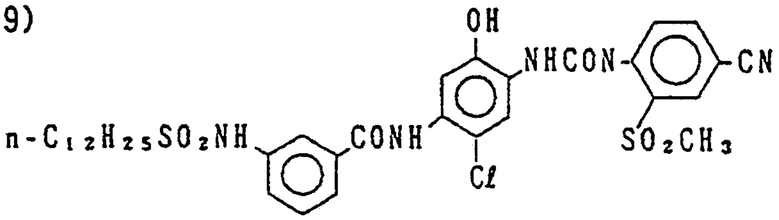

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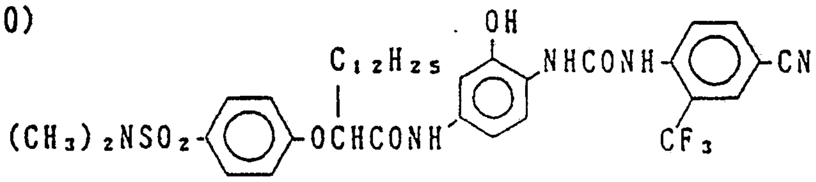

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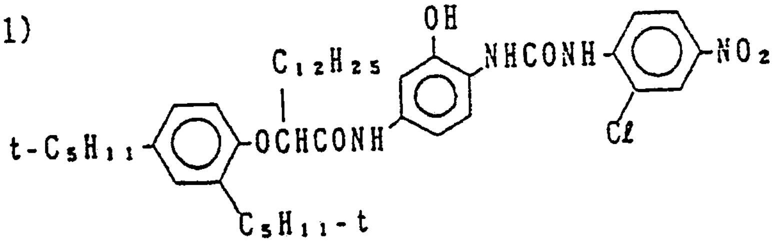

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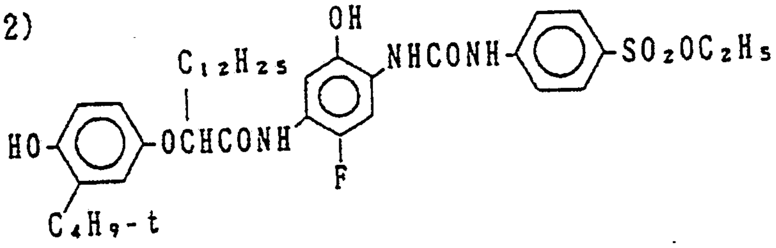

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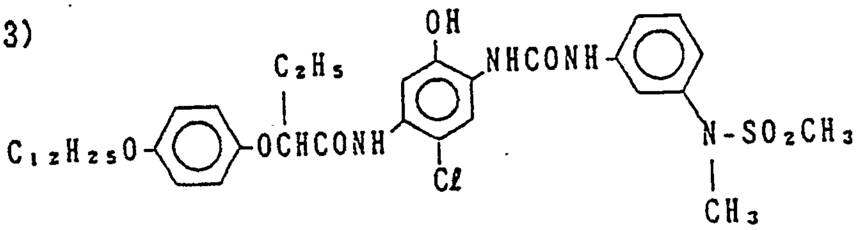

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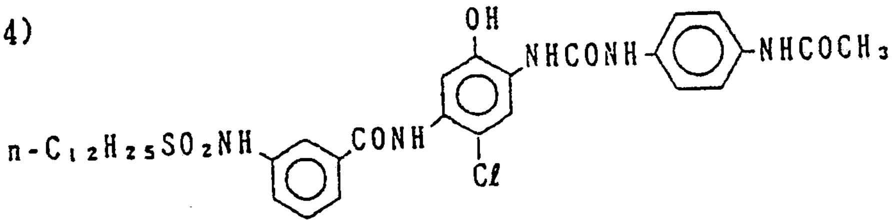

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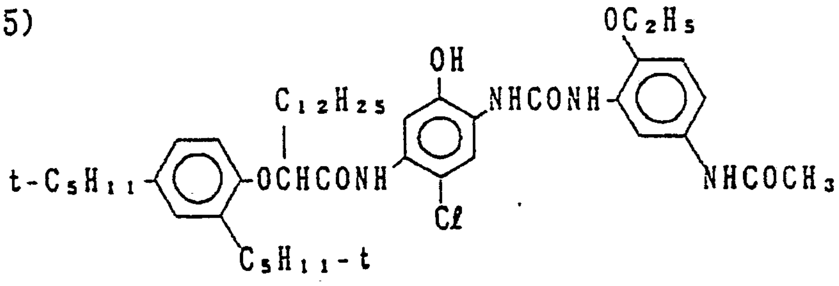

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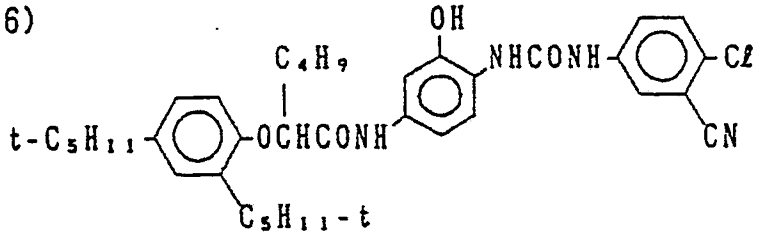

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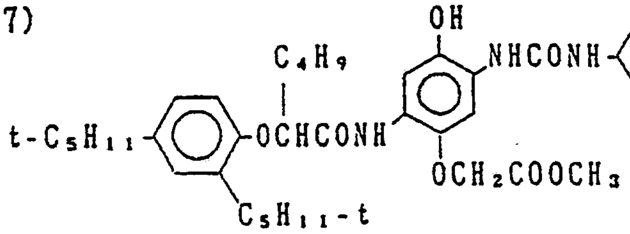


Two or more of these couplers may be incorporated in the same layer. The same coupler may be incorporated in two or more different layers. The coated amount of such a coupler is preferably from 0.02 to 2 g, more preferably 0.05 to 1.5 g, per m$^2$ of light-sensitive material. When the amount is less than 0.02 g/m$^2$ color density developed is insufficient, while it is more than 2 g/m$^2$ the color density developed is unnecessarily high.

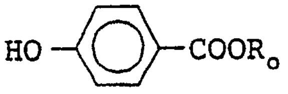
The incorporation of such a coupler in the silver halide emulsion layer can be accomplished by a known method such as disclosed in U.S. Patent 2,322,027. For example, such a coupler can be dispersed in a hydrophilic colloid in the form of solution in a phthalic alkylester (e.g., dibutyl phthalate, dioctyl phthalate), phosphoric ester (e.g., diphenyl phosphate, triphenyl phosphate, tricresyl phosphate, dioctylbutyl phosphate), citric ester (e.g., tributyl acetylcitrate), benzoic ester (e.g., octyl benzoate), alkylamido (e.g., diethyllaurylamido), aliphatic ester (e.g., dibutoxyethyl succinate, dioctyl azerate), or an organic solvent having a boiling point of about 30°C to 150°C, such as lower alkyl acetate (e.g., ethyl acetate, butyl acetate), ethyl propionate, secondary butyl alcohol, methyl isobutyl ketone, $\beta$-ethoxyethyl acetate, and methyl cellosolve acetate. These high boiling organic solvents and low boiling organic solvents may be used in admixture.

A dispersion method using a polymer as disclosed in JP-B-51-39853 and JP-A-51-59943 can be used. If the coupler contains an acid group such as carboxylic acid and sulfonic acid, it is normally incorporated in the hydrophilic colloid in the form of solution in an alkaline aqueous solution.

When the coupler represented by formula (I) is used, deterioration of the emulsion during storing, preparation or retention upon feeding can be prevented, and causing clogging in the filters at the coating process and deterioration in the properties of the coating surface (occurrence of foreign matters) are also prevented.

General formula (II) will be further described hereinafter.

The compound of the general formula (II) is incorporated in the emulsion to prevent the emulsion from deteriorating with time during the retention at the preparation and feed processes and causing clogging in the filters at the coating process or deterioration in the properties of the coating suface (occurrence of foreign matters). Such a compound also has antiseptic and antifungal effects and is extremely useful.



(II)

wherein $R_0$ represents a methyl group, ethyl group, propyl group, butyl group or amyl group, particularly n-propyl group or n-butyl group.

The compound of general formula (II) may be incorporated in the light-sensitive material in the form of a dispersion in gelatin, in the form of a dispersion using various solvents or in the form of an emulsified dispersion using a high boiling solvent. The compound of general formula (II) may be incorporated in any layer in the light-sensitive material. The compound can be used as an antiseptic. In a preferred embodiment of the present invention, the compound of general formula (II) is incorporated in a layer containing a coupler, particularly a cyan coupler, and phenol may be incorporated in other layers as antiseptic. When phenol is used in the layer containing the compound of general formula (II), it is preferably used in an amount of not more than 10 mg/m$^2$. In the most preferred embodiment, at least one compound of general formula (II) is incorporated in all layers. If desired, two or more such compounds may be incorporated in these layers in admixture.

The amount of the compound of formula (II) to be incorporated is preferably from 0.1 to 10 mg, more preferably 0.5 to 5 mg per g of dried gelatin.

When the amount is less than 0.1 mg per g of dried gelatin in the layer containing the compound, the effects of the persent invention are insufficiently obtained, while when the amount is more than 10 mg per g of dried gelatin, it results in decrease of sensitivity.

In the present invention the cyan coupler represented by general formula (I) and the compound represented by general formula (II) may be incorporated in the same photographic material.

In the most preferred embodiment of the present invention, a number of layers are simultaneously multilayer coated to give a finished product having the best surface quality. However, even a coating process is carried out in two or more separate operations can provide desired products with the best surface quality if one of these coating operations involves a simultaneous multilayer coating of 10 or more layers including major emulsion layers (i.e., blue-, red- and green-sensitive silver halide emulsion layers). For example, if the two lowermost layers of the antihalation layer and the interlayer, and two upper layers, i.e., first protective layer and second protective layer, and some of the emulsion layers are separately coated, and 10 or more other layers are simultaneously multi-coated, it is possible to provide a finished product with an excellent surface quality.

In the present invention it is preferred that these 10 or more layers include the red-sensitive silver halide emulsion layer containing the coupler represented by formula (I), and/or include the layer containing the compound represented by formula (II).

In the present invention, it is preferred to use a simultaneous multilayer coating process in one operation by which all layers including necessary silver halide emulsion layers and the like are coated to provide a finished product. In this case, or in a case where first 10 or more layers are coated simultaneously or like cases, it is preferred that the coating is conducted at a temperature of 39 ± 1 °C and to use a coating liquid having a viscosity of 15 to 100 cp for the lowermost layer adjacent to the support. This is because a coating liquid having a viscosity of lower than 15 cp can cause color nonuniformity when subjected to simultaneous coating of 10 or more layers, while a coating solution having a viscosity of higher than 100 cp gives poor adhesion, causing breakage of the coated liquid at the both ends. The viscosity of the coating liquid is preferably from 20 to 70 cp, more preferably 20 to 60 cp.

In another embodiment of the present invention, if the lowermost two layers of the antihalation layer and the interlayer are separately coated on a support, it is preferred that a coating liquid having a viscosity of 15 to 100 cp be used for the lowermost layer adjacent to the support to prevent the occurrence of color non-uniformity as in the above mentioned cases. However, in the subsequent simultaneous coating of 10 or more layers, this precaution is not necessary for the first layer. of the 10 or more layers

In the present invention, in the case where a simultaneous multilayer coating process is effected in one operation to provide a finished product or in the case where first 10 or more layers are simultaneously coated, the viscosity of the coating liquids for the 9 or more layers coated in order adjacently to the lowermost layer is preferably adjusted to 30 cp or more for each coating liquid, and the viscosity of the coating liquids for the 9 or more layers has an arithmetic mean of 60 to 300 cp. If the viscosity of these coating liquids is lower than 30 cp, color nonuniformity can occur while if it is higher than 300 cp, defoaming can hardly be effected, making it difficult to feed these coating liquids. Therefore, the viscosity of these coating liquids is preferably from 70 to 250 cp, more preferably 80 to 200 cp. In particular, the viscosity of the coating liquid for the second layer adjacent to the lowermost layer is preferably greater than that of the coating liquid for the lowermost layer, more preferably greater than 1.5 times that of the coating liquid for the lowermost layer, more preferably 1.8 to 5 times that of the coating solution for the lowermost layer. Moreover, the viscosity of the coating liquids for the 9 or more layers are adjusted to an arithmetic mean of 60 to 300 cp.

If the lowermost two layers of the antihalation layer and the interlayer are separately coated on a support, it is not necessary to distinguish the viscosity of the coating liquid for the lowermost layer and the coating liquid for the second layer adjacent thereto from that of the coating liquids for the upper layers.

The adjustment of these coating liquids to predetermined values can be accomplished by adding an aqueous solution of a known thickening agent to the system. Typical examples of such a known thickening agent include poly(sodium p-stylenesulfonate). Other examples of such a thickening agent include vinyl polymers containing side chains which contain a sulfonic acid group, sulfuric ester group or a carboxylic acid group or salts thereof as disclosed in JP-A-63-11934.

The viscosity of the coating solutions can be measured by means of a Type B viscometer (Model BL, available from Tokyo Keiki K.K.) at a shear rate of 29.8 mm/sec. (rotor No. 1; 30 rpm; 40° C).

In a preferred embodiment of the present invention, the coated amount of each layer is preferably 3 mℓ/m$^2$ or more. If this value is lower than this range, a wave nonuniformity occurs on the sliding surface of a slide hopper, making it impossible to provide a uniform multilayer coating on a support. More preferably, the coated amount of each layer is from 4 to 30 mℓ/m$^2$. If 10 or more layers are simultaneously coated in an amount of 30 mℓ/m$^2$ or more for any one of these layers, the photographic constituting layers thus coated can cause color nonuniformity.

If a simultaneous multilayer coating is effected in one operation (where all layers are simultaneously coated) to provide a finished product or where the first 10 or more layers are simultaneously coated, the total coated amount of the lowermost layer and 9 or more layers adjacent thereto is preferably 250 mℓ/m$^2$ or less, or if the two lowermost layer of antihalation layer and the interlayer are separately coated, the total coated amount of 10 or more layers including the two lowermost layers is preferably 250 mℓ/m$^2$ or less. If this value exceeds this upper limit, the photographic constituting layers thus coated can cause color nonuniformity. Further taking into account the weakening of drying conditions, the total coated amount of these layers is more preferably about 200 mℓ/m$^2$ or less.

The simultaneous multilayer coating apparatus to be used in the present invention is summarized in JP-B-33-8977 corresponding to U.S. Patent 2,761,791. For example, a slide hopper type coating apparatus capable of simultaneously coating 10 or more layers of the same type, such as a slide hopper type coating apparatus capable of simultaneously coating n layers as shown in the Figure, may be used. In operation, predetermined coating liquids are fed to 10 or more slits and coated in such a manner that they are laminated on one another when flowing down along the sliding surface.

Referring to the Figure illustrating the slide hopper coating apparatus, onto a support 2 which is moving and which is carried on a backup roller 1, there are coated coating liquids with the tip 4 of a slide hopper injector 3(1) which is adjacent to the support, to form a bridge 5 of coating liquids (called "bead portion"). A vacuum chamber 6 for reducing the pressure in the rear portion of the bead is provided to stabilize bead portion 5. The pressure in vacuum chamber 6 is reduced by a vacuum pump 7. The degree of the reduction in the pressure is called "bead back pressure".

Referring to the slide hopper injector in the simultaneous multilayer coating apparatus, coating liquids for n layers are supplied into injector 3(l) to 3(n) by feed pumps 8(l) to 8(n), and then discharged through slits 9(l) to 9(n) to form thin coating films onto each of sliding sufaces 10(l) to 10(n) over the full width of support 2. The thin films thus discharged are laminated on one another, and the lamination comprising n layers of coating liquids is then coated on the support.

The reason why this apparatus is called a slide hopper coating apparatus is that thin films of coating liquids are laminated on one another on the sliding surface.

The present invention can be applied to a process for the simultaneous coating of 10 or more layers. In general, the present invention can be applied to the simultaneous coating of 10 to 20 layers (n = 10 to 20), preferably 12 to 18 layers (n = 12 to 18).

With respect to the coating speed, the present process can be applied to a support which is running at a speed of 30 to 500 m/min, preferably 60 to 300 m/min., more preferably 80 to 250 m/min.

The photographic consituting layers thus coated are dried in a conventional process. In other words, the photographic consituting layers which have been coated are immediately cooled for coagulation.

To this end, the coating material is broght into contact with cool air at a dry-bulb temperature of -10° C to 20° C. The coating material which has thus been cooled for coagulation is then dried by spraying a gas which has heretofore been commonly used. In this drying process, air is normally blown at a dry-bulb temperature of about 15 to 45° C, a relative humidity of about 10 to 50% and a rate of about 10 to 40 $m^3/m^2 \cdot min$. This drying process can advantageously prevent the increase in fogging due to drying.

The required drying time depends on the wet coated amount and drying conditions, and is normally 0.5 to 5 minutes. The coating film thus dried then is preferably wet by air at a dry-bulb temperature of about 20 to 40° C and a relative humidity of about 50 to 70%.

The present preparation process can be applied to a transparent or reflective support. Typical examples of such a transparent support include cellulose triacetate and polyethylene terephthalate. Examples of reflective support include polyethylene-laminated paper which is normally used for light-sensitive material for color print. With the present preparation method is used, the resulting product is less subject to unevenness on the support than that produced by the prior art preparation method. Accordingly, even if the support has an unevenness of 5 μm at maximum in depth, the present preparation method can provide a color light-sensitive material with an excellent surface quality at a high coating speed. In a support having an unevenness, the interval of peaks of the unevenness need not be between 5 mm and 8 mm. Intervals shorter or longer than this range are allowable. If this value falls below 5 mm or exceeds 8 mm, the unevenness can hardly affect the uniformity of coating.

The light-sensitive material of the present invention preferably comprises at least 10 layers including a blue-sensitive layer, a green-sensitive layer and a red-sensitive layer simultaneously coated on a support.

In the multi-layer silver halide color photographic material, these unit light-sensitive layers are normally arranged in the order of red-sensitive layer, green-sensitive layer and blue-sensitive layer as viewed from the support. However, the order of arrangement can be optionally reversed or a light-sensitive layer may be sandwitched between two light-sensitive layers having a different color sensitivity from that of former depending on the purpose of application.

In a layer structure as disclosed in JP-A-61-34541, JP-A-61-201245, JP-A-61-198236, and JP-A-62-160448, a fourth or more of color-sensitive light-sensitive layers are provided in addition to these blue-sensitive, green-sensitive and red-sensitive layers to improve the color reproductivity. In this layer structure, the fourth or more of color sensitive layers may be provided in any positions. The fourth color sensitive layer or the other additive color sensitive layers may consist of a single layer or a plurality of layers.

Light-insensitive layers (such as various interlayers) may be provided between the above mentioned silver halide light-sensitive layers, or may be provided as the uppermost layer or lowermost layer.

These interlayers can comprise couplers, DIR compounds or the like as described in JP-A-61-43748, JP-A-59-113438, JP-A-59-113440, JP-A-61-20037 and JP-A-61-20038. These interlayers can further comprise a color stain inhibitor as commonly used.

The plurality of silver halide emulsion layers constituting each unit light-sensitive layer can be preferably in a two-layer structure, i.e., high sensitivity emulsion layer and low sensitivity emulsion layer, as described in West German Patent 1,121,470 and British Patent 923,045. In general, these layers are preferably arranged in such an order that the light sensitivity becomes lower towards the support. Furthermore, a light-insensitive layer can be provided between these silver halide emulsion layers. As described in JP-A-57-112751, JP-A-62-200350, JP-A-62-206541, and JP-A-62-206543, a low sensitivity emulsion layer can be provided remote from the support while a high sensitivity emulsion layer can be provided nearer to the support.

In an embodiment of such an arrangement, a low sensitivity blue-sensitive layer (BL), a high sensitivity blue-sensitive layer (BH), a high sensitivity green-sensitive layer (GH), a low sensitivity green-sensitive layer (GL), a high sensitivity red-sensitive layer (RH), and a low sensitivity red-sensitive layer (RL) can be arranged in this order from the farthest side from the support. In another embodiment, BH, BL, GL, GH, RH, and RL can be arranged in this order from the farthest side from the support. In a further embodiment, BH, BL, GH, GL, RL, and RH can be arranged in this order from the farthest side from the support.

As described in JP-B-55-34932, a blue-sensitive layer, GH, RH, GL, and RL can be arranged in this order from the farthest side from the support. Alternatively, as described in JP-A-56-25738 and JP-A-62-63936, a blue-sensitive layer, GL, RL, GH, and RH can be arranged in this order from the farthest side from the support.

As described in JP-B-49-15495, a layer arrangement can be used such that the uppermost layer is a silver halide emulsion layer having the highest sensitivity, the middle layer is a silver halide emulsion layer having a lower sensitivity, and the lowermost layer is a silver halide emulsion layer having a lower sensitivity than that of the middle layer. In such a layer arrangment, the light sensitivity becomes lower towards the support. Even if the layer structure comprises three layers having different light sensitivities, a middle sensitivity emulsion layer, a high sensitivity emulsion layer and a low sensitivity emulsion layer can be arranged in this order from the farthest side from the support in a color-sensitive layer as described in JP-A-59-202464.

Alternatively, a high sensitivity emulsion layer, a low sensitivity emulsion layer and a middle sensitivity emulsion layer or a low sensitivity emulsion layer, a middle sensitivity emulsion layer and a high sensitivity emulsion layer can be arranged in this order.

In the case where the layer structure comprises four or more layers, too, the order of arrangement of layers can be altered as described above.

The amount of light-sensitive silver halide to be incorporated in the present light-sensitive material is not specifically limited and is preferably from 3 to 10 g/m$^2$, more preferably 3 to 7 g/m$^2$, as calculated in terms of amount of silver.

The amount of silver in an emulsion layer based on the amount of gelatin binder in the emulsion layer is not specifically limited and may be from 0.01 to 5.0 as calculated in terms of weight ratio of amount of silver to amount of gelatin, depending on whether the layer is a high sensitivity emulsion layer, a low sensitivity emulsion layer and on other purposes.

A suitable silver halide to be incorporated in the photographic emulsion layer in the color light-sensitive material of the present invention is silver bromoiodide, silver chloroiodide or silver bromochloroiodide containing silver iodide in an amount of about 30 mol% or less and silver chloride in an amount of 0 to 56 mol%. Particularly suitable is silver bromoiodide containing silver iodide in an amount of about 2 mol% to about 25 mol%.

Silver halide grains in the photographic emulsions may be so-called regular grains having a regular crystal form, such as a cube, octahedron or tetradecahedron, or those having an irregular crystal form such as a spherical form or a tabular form,, those having a crystal defect such as twinning plane, or those having a combination of these crystal forms.

The silver halide grains may be either fine grains of about 0.2 μm or smaller in diameter or large grains having a projected area diameter or up to about 10 μm. The emulsion may be either a monodisperse emulsion or a polydisperse emulsion.

The preparation of the silver halide photographic emulsion which can be used in the present invention can be accomplished by any suitable method as described in Research Disclosure No. 17643 (December 1978), pp. 22-23, "I. Emulsion Preparation and Types", and No. 18716 (November 1979), page 648, Glafkides, "Chimie et Physique Photographique", Paul Montel (1967), G.F. Duffin, "Photographic Emulsion Chemistry", Focal Press, 1966, and V.L. Zelikman et al., "Making and Coating Photographic Emulsion Focal Press", 1964.

Furthermore, monodisperse emulsions as described in U.S. Patents 3,574,628 and 3,655,394, and British Patent 1,413,748 can be preferably used in the present invention.

Tabular grains having an aspect ratio of about 5 or more can be used in the present invention. The preparation of such tabular grains can be easily accomplished by any suitable method as described in Gutoff, "Photograpahic Science and Engineering", vol. 14, pp. 248-257, 1970, U.S. Patents 4,434,226, 4,414,310, 4,433,048, and 4,439,520, and British Patent 2,112,157.

The individual silver halide crystals may have either a homogeneous structure or a heterogeneous structure composed of a core and an outer shell differing in halogen composition, or may have a layered structure. Furthermore, the grains may have fused thereto a silver halide having a different halogen composition or a compound other than silver halide, e.g., silver thiocyanate, lead oxide, etc. by an epitaxial junction.

Mixtures of grains having various crystal forms may also be used.

The silver halide emulsion to be used in the present invention is normally subjected to physical ripening, chemical ripening and spectral sensitization. Additives to be used in these steps are described in Research Disclosure Nos. 17643 and 18716 as tabulated below.

Known photographic additives which can be used in the present invention are also described in the above cited two references as shown in the table.

| Kind of additive | RD17643 | RD18716 |
|---|---|---|
| 1. Chemical sensitizer | p. 23 | p. 648 right column (RC) |
| 2. Sensitivity increasing agent | | " |
| 3. Spectral sensitizer and supersensitizer | pp. 23-24 | p. 648 RC-<br>p. 649 RC |
| 4. Brightening agent | p. 24 | |
| 5. Antifoggant and stabilizer | pp. 24-25 | p. 649 RC |
| 6. Light absorbent, filter dye, and ultraviolet absorbent | pp. 25-26 | p. 649 RC-<br>p. 650 left column (LC) |
| 7. Stain inhibitor | p. 25 RC | p. 650 LC-RC |
| 8. Dye image stabilizer | p. 26 | |
| 9. Hardening agent | p. 26 | p. 651 LC |
| 10. Binder | p. 26 | " |
| 11. Plasticizer and lubricant | P. 27 | p. 650 RC |
| 12. Coating aid and surface active agent | pp. 26-27 | " |
| 13. Antistatic agent | p. 27 | " |

In order to inhibit deterioration in photographic properties due to formaldehyde gas, a compound capable of reacting with and solidifying formaldehyde as disclosed in U.S. Patents 4,411,987 and 4,435,503 can be incorporated in the light-sensitive material.

Various color couplers can be used in the present invention. Specific examples of the color couplers are described in the patents described in the above cited Research Disclosure No. 17643, VII-C to G.

Preferred yellow couplers include those described in U.S. Patents 3,933,501, 4,022,620, 4,326,024, 4,401,752, 4,248,961, 3,973,968, 4,314,023, and 4,511,649, JP-B-58-10739, British Patents 1,425,020 and 1,476,760, and European patent 249,473A.

Preferred magenta couplers include 5-pyrazolone compounds and pyrazoloazole compounds. Particularly preferred are those described in U.S. Patents 4,310,619, 4,351,897, 3,061,432, 3,725,064, 4,500,630, 4,540,654, and 4,556,630, European Patent 73,636, JP-A-60-33552, 60-43659, 61-72238, 60-35730, 55-118034, and 60-185951, RD Nos. 24220 (June 1984) and 24230 (June 1984), and Published International Application (WO) 88/04795.

Cyan couplers include naphthol and phenol couplers. Preferably phenol couplers are used predominantly and the naphthol couplers are used in an amount of not more than 0.2 g/m$^2$. Preferred are those described in U.S. Patents 4,052,212, 4,146,396, 4,228,233, 4,296,200, 2,369,929, 2,801,171, 2,772,162, 2,895,826, 3,772,002, 3,758,308, 4,334,011, 4,327,173, 3,446,622, 4,333,999, 4,775,616, 4,451,559, 4,427,767, 4,690,889, 4,254,212, and 4,296,199, West German Patent Publication No. 3,329,729, European

Patents 121,365A and 249,453A, and JP-A-61-42658.

Colored couplers for correction of unnecessary absorptions of the developed color preferably include those described in Research Disclosure No. 17643, VII-G, U.S. Patents 4,163,670, 4,004,929, and 4,138,258, JP-B-57-39413, and British Patent 1,146,368. Furthermore, couplers for correction of unnecessary absorptions of the developed dye by a fluorescent dye released upon coupling as described in U.S. Patent 4,774,181 and couplers containing as a releasing group a dye precursor group capable of reacting with a developing agent to form a dye as described in U.S. Patent 4,777,120 can be preferably used.

Couplers which form a dye having moderate diffusibility preferably include those described in U.S. Patent 4,366,237, British Patent 2,125,570, European Patent 96,570, and West German Patent Publication No. 3,234,533.

Typical examples of polymerized dye-forming couplers are described in U.S. Patents 3,451,820, 4,080,211, 4,367,282, 4,409,320, and 4,576,910, and British Patent 2,102,173.

Couplers capable of releasing a photographically useful group upon coupling can also be used in the present invention. Preferred examples of DIR couplers which release a developing inhibitor are described in the patents cited in Research Disclosure 17643, VII-F, VII-F, JP-A-57-151944, JP-A-57-154234, JP-A-60-184248, and JP-A-63-37346, and U.S. Patents 4,248,962, and 4,782,012.

Couplers capable of imagewise releasing a nucleating agent or a developing accelerator at the time of development preferably include those described in British Patents 2,097,140 and 2,131,188, and JP-A-59-157638 and JP-A-59-170840.

In addition to the foregoing couplers, the photographic material according to the present invention can further comprise competing couplers as described in U.S. Patent 4,130,427, polyequivalent couplers as described in U.S. Patents 4,283,472, 4,338,393, and 4,310,618, DIR redox compound releasing couplers, DIR coupler releasing couplers, DIR coupler-releasing redox compounds or DIR redox releasing redox compounds as described in JP-A-60-185950 and JP-A-62-24252, couplers capable of releasing a dye which returns to its original color after release as described in European Patent 173,302A, couplers capable of releasing a bleach accelerator as described in RD Nos. 11449 and 24241, and JP-A-61-201247, couplers capable of releasing a ligand as described in U.S. Patent 4,553,477, couplers capable of releasing a leuco dye as described in JP-A-63-75747, and couplers capable of releasing a fluorescent dye as described in U.S. Patent 4,774,181.

The incorporation of these couplers in the light-sensitive material can be accomplished by any suitable known dispersion method such as an oil-in-water dispersion process or a latex dispersion process.

Examples of high boiling solvents to be used in the oil-in-water dispersion process are described in U.S. Patent 2,322,027.

Specific examples of high boiling organic solvents having a boiling point of 175 ° C or higher at normal pressure which can be used in the oil-in-water dispersion process include phthalic esters (e.g., dibutyl phthalate, dicylcohexyl phthalate, di-2-ethylhexyl phthalate, decyl phthalate, bis(2,4-di-t-amylphenyl)-phthalate, bis(2,4-di-t-amylphenyl)isophthalate, bis(1,1-diethylpropyl)phthalate), phosphoric or phosphonic esters (e.g., triphenyl phosphate, tricresyl phosphate, 2-ethylhexyl diphenyl phosphate, tricyclohexyl phosphate, tri-2-ethylhexyl phosphate, tridecyl phosphate, tributoxy ethyl phosphate, trichloropropyl phosphate, di-2-ethylhexyl phenyl phosphonate), benzoic esters (e.g., 2-ethylhexyl benzoate, dodecyl benzoate, 2-ethylhexyl-p-hydroxy benzoate), amides (e.g., N,N-diethyldodecanamide, N,N-diethyllaurylamide, N-tetradecylpyrrolidone), alcohols or phenols (e.g., isostearyl alcohol, 2,4-di-tert-amylphenol), aliphatic carboxylic esters (e.g., bis(2-ethylhexyl)sebacate, dioctyl azelate, glycerol tributylate, isostearyl lactate, trioctyl citrate), aniline derivatives (e.g., N,N-dibutyl-2-butoxy-5-tert-octylaniline), and hydrocarbons (e.g., paraffin, dodecylbenzene, diisopropyl naphthalene). As an auxiliary solvent there can be used an organic solvent having a boiling point of about 30 ° C or higher, preferably 50 ° C to about 160 ° C. Typical examples of such an auxiliary organic solvent include ethyl acetate, butyl acetate, ethyl propionate, methyl ethyl ketone, cyclohexanone, 2-ethoxyethyl acetate, and dimethylformamide.

The process and effects of a latex dispersion method and specific examples of latexes to be used in impregnation are described in U.S. Patent 4,199,363, West German Patent Application (OLS) 2,541,274, and 2,541,230.

The present invention is applicable to various types of color light-sensitive materials, particularly preferably to color negative films for common use or motion picture, color reversal films for slide or television, color papers, color positive films and color reversal papers.

Suitable supports which can be used in the present invention are described in the above cited Research Disclosure (RD) 17643 (page 28) and 18716 (right column on page 647 to left column on page 648).

In the present light-sensitive material, the total thickness of all hydrophilic colloidal layers on the emulsion side is preferably 24 $\mu$m or less, more preferably 20 $\mu$m or less, particularly 18 $\mu$m or less. The film swelling rate $T_{1/2}$ is preferably 30 seconds or less, more preferably 20 seconds or less. In the present invention, the film thickness is determined after being stored at a temperature of 25 °C and a relative humidity of 55% over 2 days. The film swelling rate $T_{1/2}$ can be determined by a method known in the art, e.g., by means of a swellometer of the type as described in A. Green et al, "Photographic Science Engineering", vol. 19, No. 2, pp. 124-129. $T_{1/2}$ is defined as the time taken until half the saturated film thickness is reached wherein the saturated film thickness is 90% of the maximum swollen film thickness reached when the light-sensitive material is processed with a color developer at a temperature of 30 °C over 195 seconds.

The film swelling rate $T_{1/2}$ can be adjusted by adding a film hardener to gelatin as binder or altering the ageing condition after coating. The percent swelling of the light-sensitive material is preferably from 150 to 400%. The percent swelling can be calculated from the maximum swollen film thickness determined as described above in accordance with the equation: (maximum swollen film thickness - film thickness)/film thickness.

The color photographic light-sensitive material according to the present invention can be developed in accordance with a conventional method as described in RD Nos 17643 (pp. 28-29) and 18716 (left column - right column on page 651).

If the light-sensitive material of the present invention is used in a rolled form, it is preferably housed in a cartridge. The most commonly used cartridge is a 135-format patrone well known in the art. Other examples of cartridges which can be used in the present invention include those described in JU-A-58-67329, and JU-A-58-195236, JP-A-58-181035, JP-A-58-182634, JP-A-1-231045, and JP-A-2-170150, U.S. Patents 4,221,479, 4,846,418, 4,848,693, and 4,832,275, and Japanese Patent Application Nos. 63-183344, 1-21862, 1-25362, 1-30246, 1-20222, 1-21863, 1-37181, 1-33108, 1-85198, 1-172595, 1-172594, and 1-172593.

The present invention will be further described in the following examples, but the present invention should not be construed as being limited thereto.

## EXAMPLE 1

(Comparative Example)

A multilayer color light-sensitive material was prepared as Specimen 101 by coating on an undercoated cellulose triacetate film support 1st to 14th layers having the following compositions.

(Composition of photographic layer)

The coated amount of silver halide and colloidal silver is represented in g/m$^2$ as calculated in terms of amount of silver. The coated amount of coupler, additives and gelatin is represented in g/m$^2$. The coated amount of sensitizing dye is represented in molar amount per mol of silver halide in the same layer.

| 1st Layer: Anti-halation Layer | Coated Amount |
|---|---|
| Black colloidal silver | 0.15 |
| Gelatin | 1.5 |
| ExM-8 | 0.02 |
| Cpd-11 | 0.05 |

2nd Layer: Interlayer

| | |
|---|---|
| Gelatin | 1.5 |
| UV-1 | 0.03 |
| UV-2 | 0.06 |
| UV-3 | 0.07 |
| ExF-1 | 0.004 |
| Solv-2 | 0.07 |
| Cpd-11 | 0.05 |

3rd Layer: Low Sensitivity Red-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 2 mol%; high internal AgI type; grain diameter: 0.3 µm as calculated in terms of sphere; grain diameter variation coefficient: 29% as calculated in terms of sphere; mixture of regular crystal and twinning grains; diameter/thickness ratio: 2.5): coated silver | 0.5 |
| Gelatin | 1.0 |
| ExS-1 | $1.0 \times 10^{-4}$ |
| ExS-2 | $3.0 \times 10^{-4}$ |
| ExF-3 | $1.0 \times 10^{-5}$ |
| ExC-3 | 0.22 |
| ExC-4 | 0.02 |
| Solv-1 | 0.20 |
| Cpd-11 | 0.03 |

4th Layer: Middle Sensitivity Red-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 4 mol%; high internal AgI type; grain diameter: 0.55 μm as calculated in terms of sphere; grain diameter variation coefficient: 20% as calculated in terms of sphere; mixture of regular crystal and twinning grains; diameter/thickness ratio: 1): coated silver | 0.85 |
| Gelatin | 1.26 |
| ExS-1 | $1.0 \times 10^{-4}$ |
| ExS-2 | $3.0 \times 10^{-4}$ |
| ExS-3 | $1.0 \times 10^{-5}$ |
| ExC-3 | 0.33 |
| ExC-4 | 0.01 |
| ExY-14 | 0.01 |
| ExY-13 | 0.02 |
| ExC-2 | 0.08 |
| Cpd-10 | $1.0 \times 10^{-4}$ |
| Solv-1 | 0.20 |
| Cpd-11 | 0.04 |

5th Layer: High Sensitivity Red-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 10 mol%; high internal AgI type; grain diameter: 0.7 μm as calculated in terms of sphere; grain diameter variation coefficient: 30% as calculated in terms of sphere; mixed twinning grains; diameter/thickness ratio: 2): coated silver | 0.7 |
| Gelatin | 1.0 |

| | |
|---|---|
| ExS-1 | $1.0 \times 10^{-4}$ |
| ExS-2 | $3.0 \times 10^{-4}$ |
| ExS-3 | $1.0 \times 10^{-5}$ |
| ExC-3 | 0.15 |
| Solv-1 | 0.15 |
| Solv-2 | 0.08 |
| Cpd-11 | 0.03 |

### 6th Layer: Interlayer

| | |
|---|---|
| Gelatin | 1.0 |
| P-2 | 0.17 |
| Cpd-1 | 0.10 |
| Cpd-4 | 0.17 |
| Solv-1 | 0.05 |
| Cpd-11 | 0.03 |

### 7th Layer: Low Sensitivity Green-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 12 mol%; high internal AgI type; grain diameter: 0.3 μm as calculated in terms of sphere; grain diameter variation coefficient: 28% as calculated in terms of sphere; mixture of regular grains and twinning grains; diameter/thickness ratio: 2.5): coated silver | 0.30 |
| Gelatin | 0.4 |
| ExS-4 | $5.0 \times 10^{-4}$ |
| ExS-6 | $0.3 \times 10^{-4}$ |
| ExS-5 | $2.0 \times 10^{-4}$ |

| | |
|---|---|
| ExM-9 | 0.2 |
| ExY-13 | 0.03 |
| ExM-8 | 0.03 |
| Solv-1 | 0.2 |
| Cpd-11 | 0.01 |

### 8th Layer: Middle Sensitivity Green-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 4 mol%; high internal AgI type; grain diameter: 0.55 μm as calculated in terms of sphere; grain diameter variation coefficient: 20% as calculated in terms of sphere; mixture of regular crystal and twinning grains; diameter/thickness ratio: 4): coated silver | 0.7 |
| Gelatin | 1.0 |
| ExS-4 | $5.0 \times 10^{-4}$ |
| ExS-5 | $2.0 \times 10^{-4}$ |
| ExS-6 | $0.3 \times 10^{-4}$ |
| ExM-9 | 0.25 |
| ExM-8 | 0.03 |
| ExM-10 | 0.015 |
| ExY-13 | 0.04 |
| Solv-1 | 0.2 |
| Cpd-11 | 0.03 |

### 9th Layer: High Sensitivity Green-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 10 mol%; high internal AgI type; grain diameter: 0.7 μm | 0.50 |

as calculated in terms of sphere; grain diameter variation coefficient: 30% as calculated in terms of sphere; mixture of regular crystal and twinning grains; diameter/thickness ratio: 2.0): coated silver

| | |
|---|---|
| Gelatin | 0.80 |
| ExS-4 | $2.0 \times 10^{-4}$ |
| ExS-5 | $2.0 \times 10^{-4}$ |
| ExS-6 | $0.2 \times 10^{-4}$ |
| ExS-7 | $3.0 \times 10^{-4}$ |
| ExM-11 | 0.06 |
| ExM-12 | 0.02 |
| ExM-8 | 0.02 |
| Cpd-2 | 0.01 |
| Cpd-9 | $2.0 \times 10^{-4}$ |
| Cpd-10 | $2.0 \times 10^{-4}$ |
| Solv-1 | 0.20 |
| Solv-2 | 0.05 |
| Cpd-11 | 0.02 |

10th Layer: Yellow Filter Layer

| | |
|---|---|
| Gelatin | 0.6 |
| Yellow colloidal silver | 0.05 |
| Cpd-1 | 0.2 |
| Solv-1 | 0.15 |
| Cpd-11 | 0.02 |

## 11th Layer: Low Sensitivity Blue-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 4 mol%; high internal AgI type; grain diameter: 0.5 μm as calculated in terms of sphere; grain diameter variation coefficient: 15% as calculated in terms of sphere; octahedral grains): coated silver | 0.4 |
| Gelatin | 1.0 |
| ExS-8 | $2.0 \times 10^{-4}$ |
| ExY-15 | 0.9 |
| ExY-13 | 0.09 |
| Cpd-2 | 0.01 |
| Solv-1 | 0.3 |
| Cpd-11 | 0.03 |

## 12th Layer: High Sensitivity Blue-Sensitive Emulsion Layer

| | |
|---|---|
| Silver bromoiodide emulsion (AgI content: 10 mol%; high internal AgI type; grain diameter: 1.3 μm as calculated in terms of sphere; grain diameter variation coefficient: 25% as calculated in terms of sphere; mixture of regular crystal and twinning grains; diameter/thickness ratio: 4.5): coated silver | 0.5 |
| Gelatin | 0.6 |
| ExS-8 | $1.0 \times 10^{-4}$ |
| ExY-15 | 0.12 |
| Cpd-2 | 0.001 |
| Cpd-5 | $2.0 \times 10^{-4}$ |
| Solv-1 | 0.04 |

| | |
|---|---|
| Cpd-11 | 0.02 |

**13th Layer: 1st Protective Layer**

| | |
|---|---|
| Finely divided silver bromoiodide grains (mean grain diameter: 0.07 μm; AgI content: 1 mol%): coated silver | 0.2 |
| Gelatin | 0.8 |
| UV-3 | 0.1 |
| UV-4 | 0.1 |
| UV-5 | 0.2 |
| Solv-3 | 0.04 |
| Cpd-11 | 0.02 |

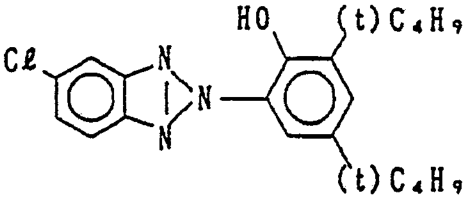
**14th Layer: 2nd Protective Layer**

| | |
|---|---|
| Gelatin | 0.9 |
| Polymethyl methacrylate grains (diameter: 1.5 μm) | 0.2 |
| H-1 | 0.4 |
| Cpd-11 | 0.03 |

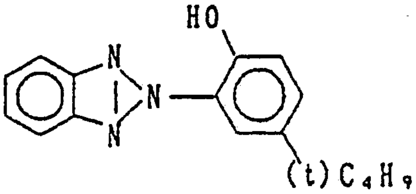
In order to improve preservability, processability, pressure resistance, antiseptic properties, antistatic properties, and coatability of the light-sensitive material, Cpd-3, Cpd-5, Cpd-6, Cpd-7, Cpd-8, P-1, P-2, W-1, W-2, and W-3 were further incorporated in the light sensitive material.

The chemical structure and chemical name of the compounds used in Examples 1 and 2 of the present specification are set forth below.

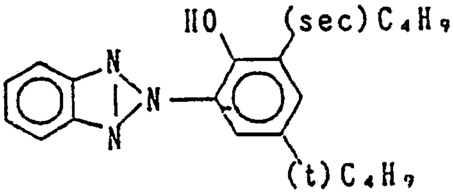
UV－1：



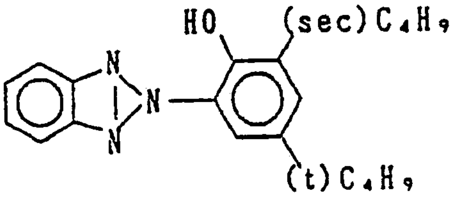
UV－2：



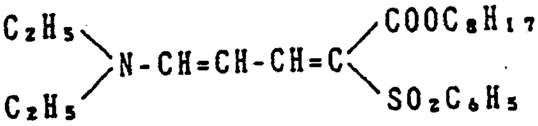
UV－3：



UV－4：



UV－5：



$$\begin{matrix}C_2H_5\\C_2H_5\end{matrix}\!\!>N\text{-}CH{=}CH\text{-}CH{=}C\!<\!\!\begin{matrix}COOC_8H_{17}\\SO_2C_6H_5\end{matrix}$$

Solv-1:

Tricresyl phosphate

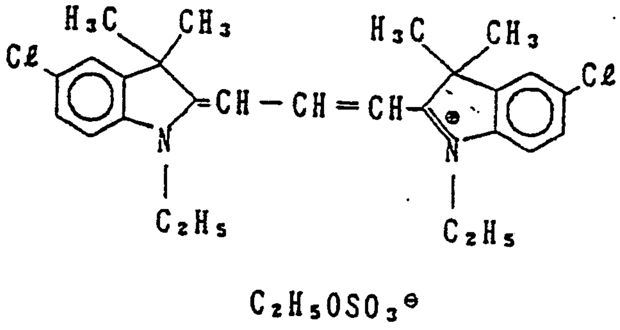
Solv-2:

Dibutyl phthalate

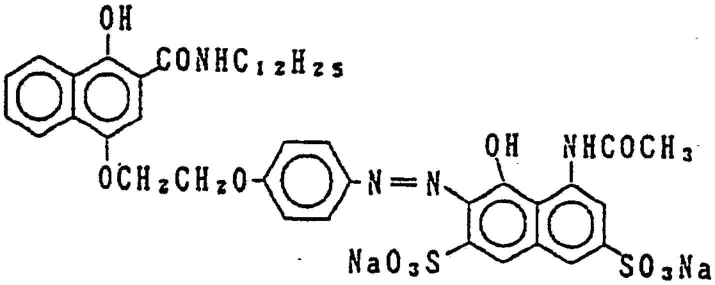
Solv-3:

Tri(2-ethylhexyl) phosphate

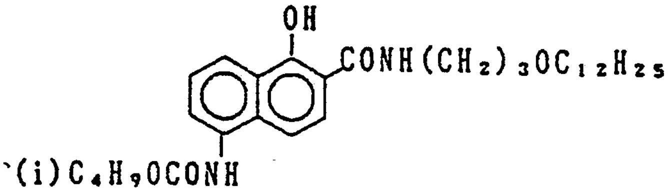
ExF-1:



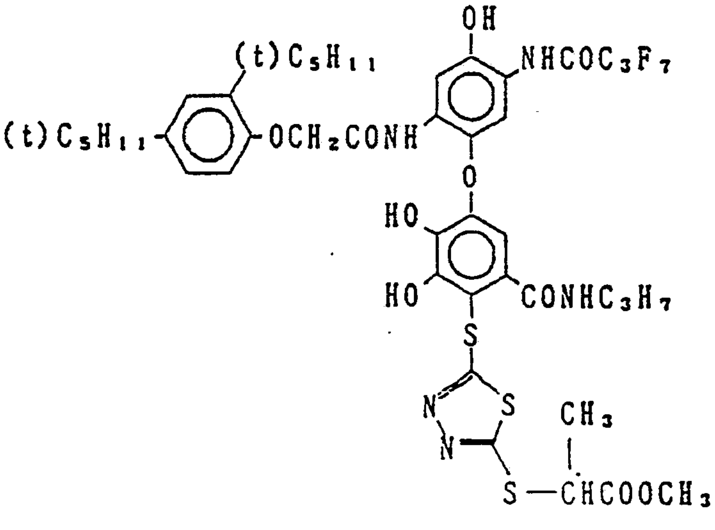
ExC−2:



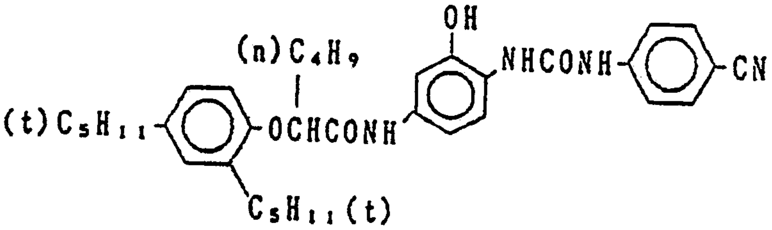
ExC−3:



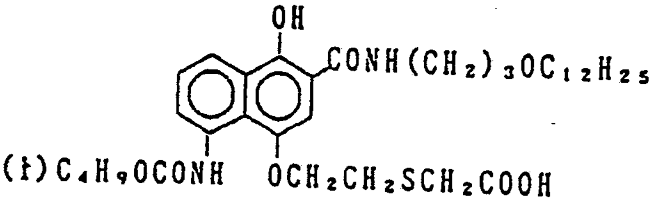
ExC−4:



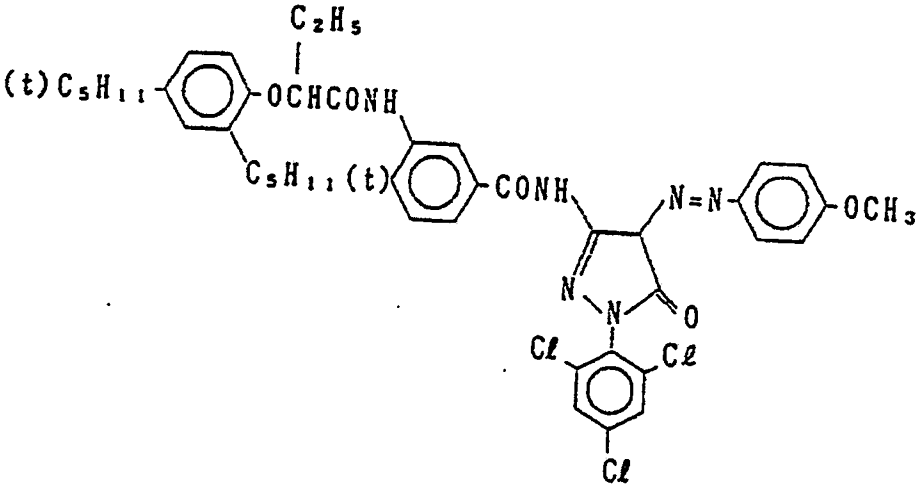
ExC－5：



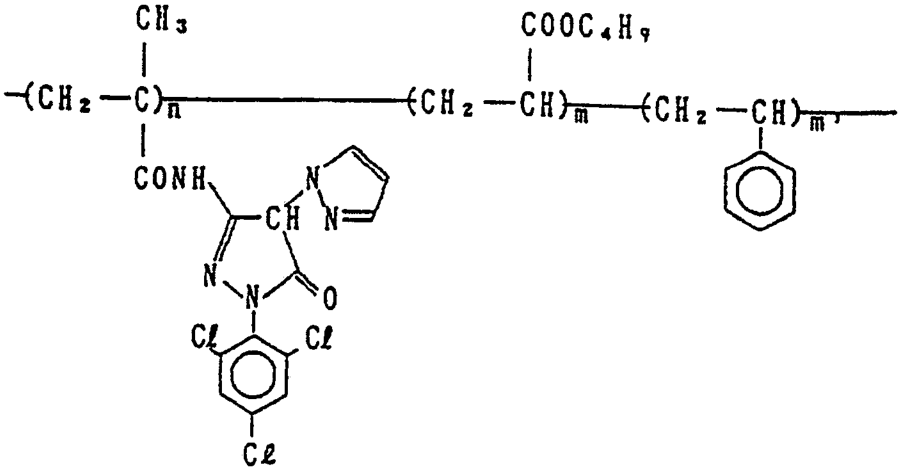
ExC－6：



ExM－8：



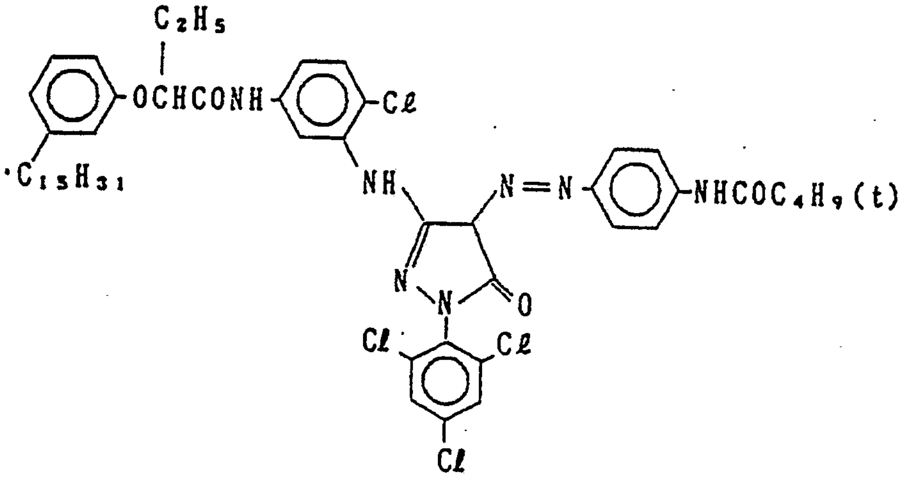
ExM-9 :



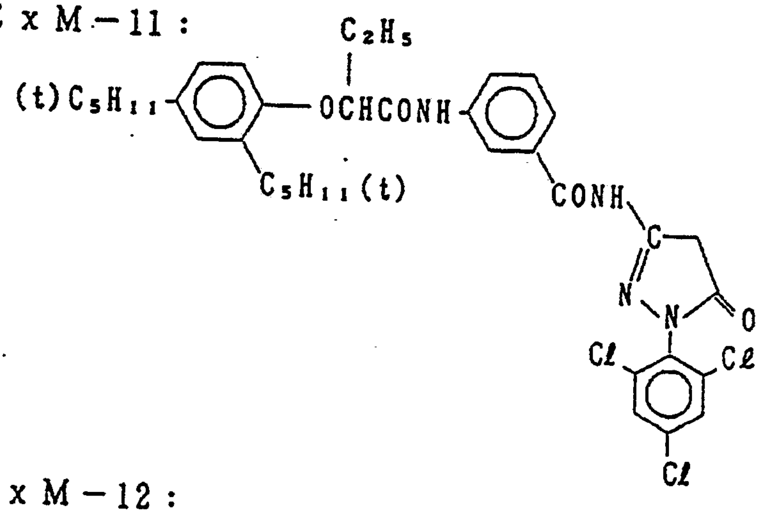
n/m/m' = 50/25/25 (by weight)

Molecular weight = about 20,000

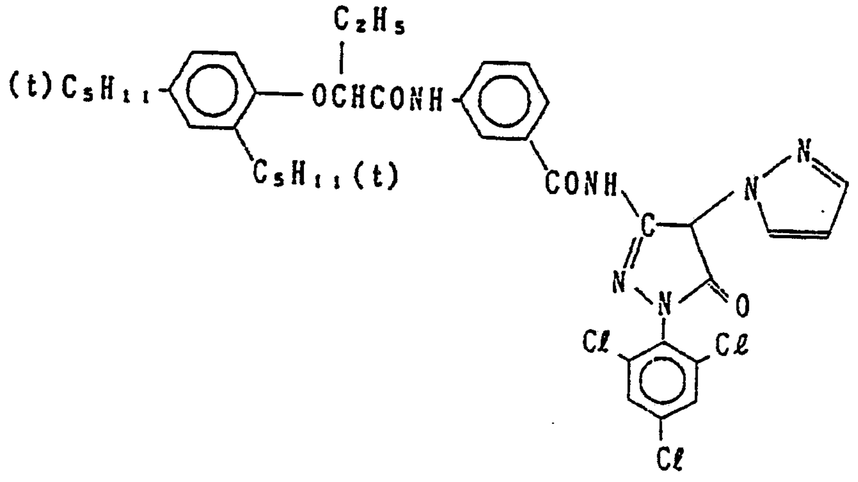
ExM-10 :



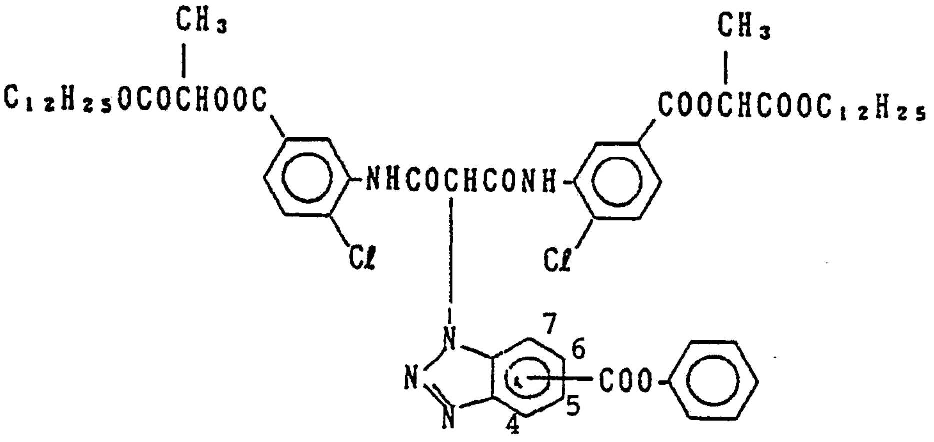
ExM-11 :



ExM-12 :

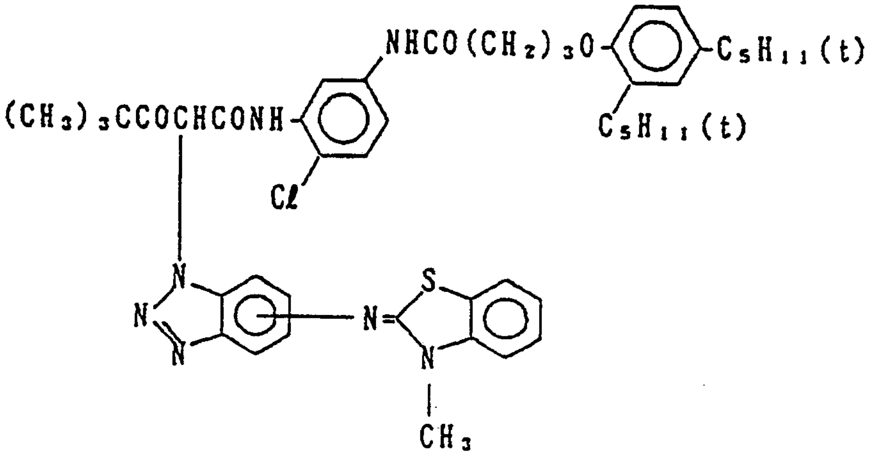


ExY-13

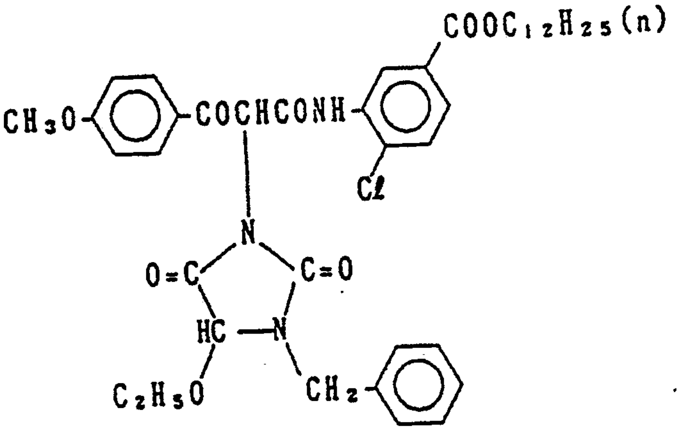


(A mixture of compounds substituted at 4-, 5-, 6- or 7-position)

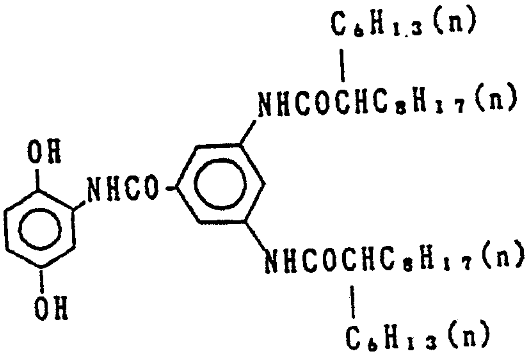
ExY-14 :



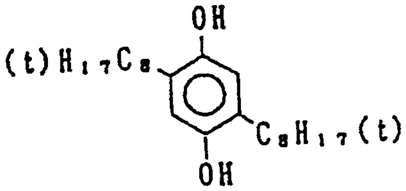
ExY-15:



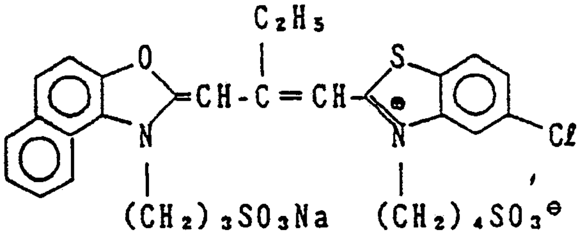
Cpd-1:



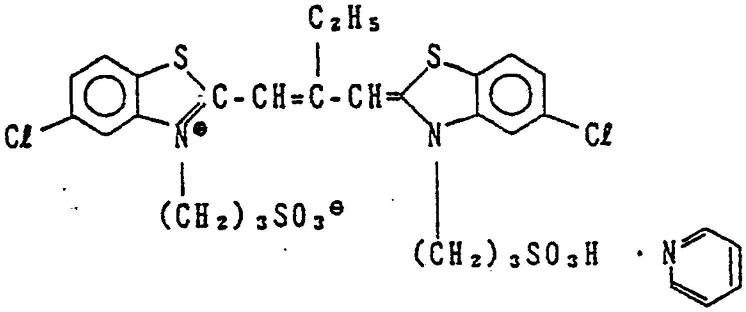
Cpd-2:



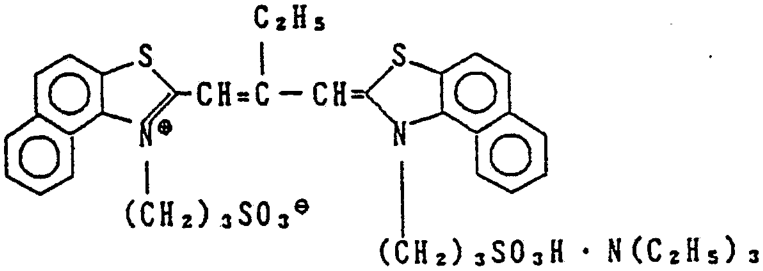
ExS-1 :



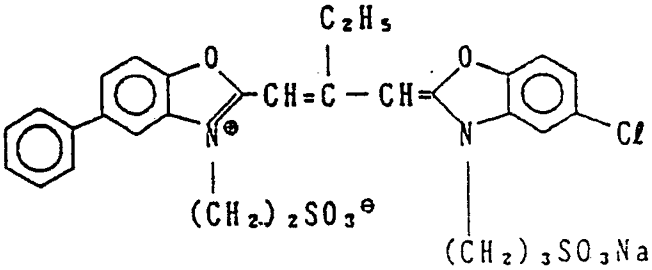
ExS-2 :



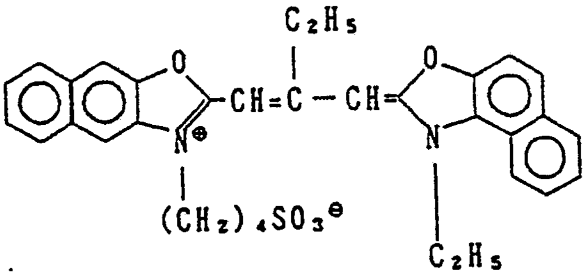
ExS-3 :



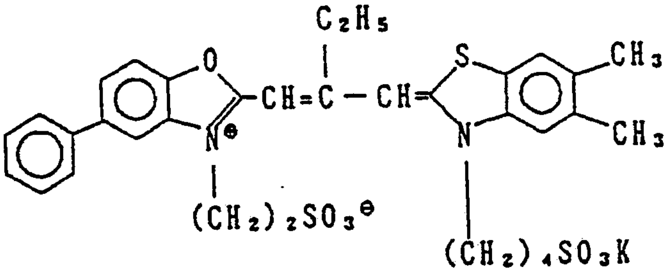
ExS-4 :



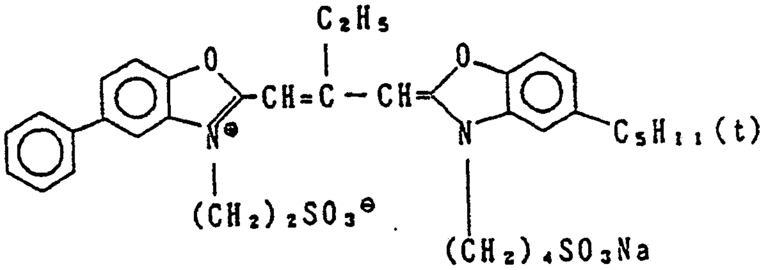
ExS-5:



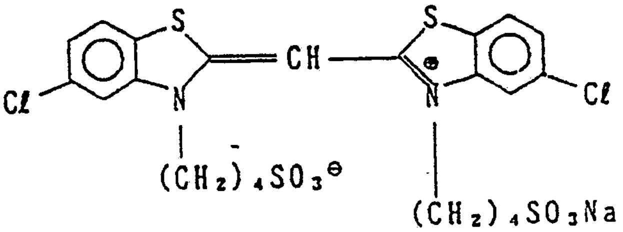
ExS-6:



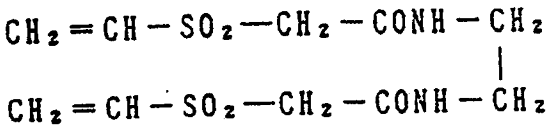
ExS-7:



ExS-8:

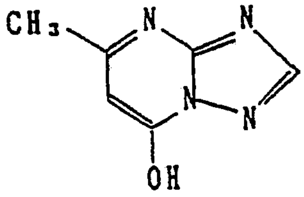


H－1：

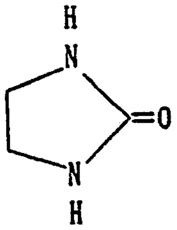


$$\begin{array}{l} CH_2=CH-SO_2-CH_2-CONH-CH_2 \\ \qquad\qquad\qquad\qquad\qquad\qquad\quad | \\ CH_2=CH-SO_2-CH_2-CONH-CH_2 \end{array}$$

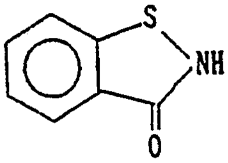
Cpd－3：



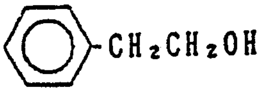
Cpd－4：



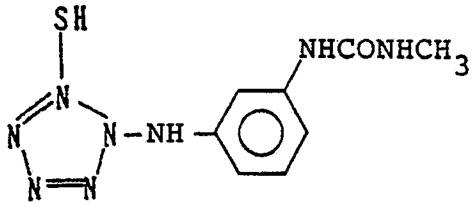
Cpd－5



Cpd-6:

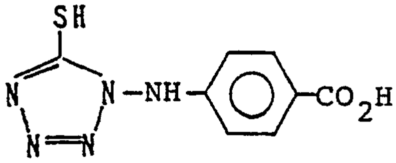


Cpd-7:

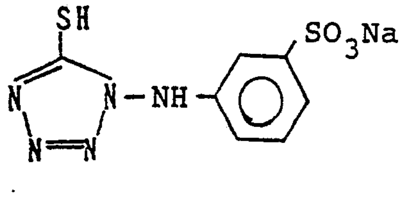


Cpd-8:

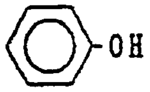
Cpd-9:



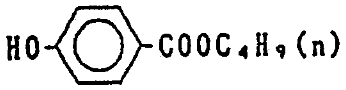
Cpd-10:



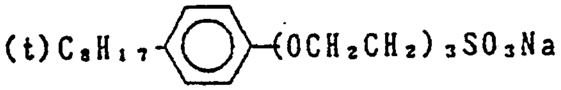
Cpd-11:



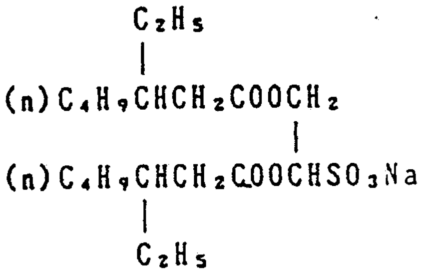
Cpd-12:



W-1:



W-2:



$$\begin{array}{l} \qquad\quad C_2H_5 \\ \qquad\quad \mid \\ (n)C_4H_9CHCH_2COOCH_2 \\ \qquad\qquad\qquad\qquad \mid \\ (n)C_4H_9CHCH_2COOCHSO_3Na \\ \qquad\quad \mid \\ \qquad\quad C_2H_5 \end{array}$$

W-3:
$C_8F_{17}SO_2N(C_3H_7)CH_2COOK$
P-1: 70 : 30 (by weight) copolymer of vinyl pyrrolidone and vinyl alcohol
P-2: Polyethyl acrylate

(Example of the present invention)

Specimens 102 to 105 as set forth in Table 1 were prepared in the same manner as in Comparative Specimen 101, except that Compound ExC-3 to be incorporated in the 3rd, 4th and 5th layers was replaced by other compounds. Furthermore, Specimens 111 to 115 were prepared in the same manner as in Specimens 101 to 105 except that the retention time of coating liquids, such as the emulsion during preparation was altered as set forth in Table 1. The term "retention time" as used herein means a "time between after preparation and before coating of coating liquid". The temperature of the coating liquids during retention were kept at 40° C.

Specimens 101 to 105 and 111 to 115 were then evaluated for face quality by the number of cometts developed due to microscopic insoluble matters of couplers. The term "comet" as used herein is further described in B.M. Deryagin et al., "Film Coating Theory", page 183, The Focal Press, 1964. The term "number of cometts" as used herein means the "number of cometts having a size of 1,000 μm or more observed per 1 $dm^2$ on the surface of a light-sensitive material under a microscope."

The results are set forth in Table 1. Table 1 shows that Specimens 104, 105, 114 and 115 comprising the present cyan couplers are less subject to face disorder due to the occurrence of foreign matters and deterioration in the face quality thereof due to retention ageing than the comparative specimens.

Table 1

| Specimen No. | Coupler in 3rd, 4th, 5th layers | Retention ageing of 3rd, 4th, 5th layers | Number of cometts per $m^2$ |
|---|---|---|---|
| 101 (comparative) | ExC-3 | 0.5 hour | 7 |
| 102 ( " ) | ExC-6 | " | 9 |
| 103 ( " ) | ExC-5 | " | 5 |
| 104 (present invention) | Exemplary Compound (11) | " | 2 |
| 105 ( " ) | " (46) | " | 1 |
| 111 (comparative) | ExC-3 | 1.0 hour | 18 |
| 112 ( " ) | ExC-6 | " | 20 |
| 113 ( " ) | ExC-5 | " | 11 |
| 114 (present invention) | Exemplary Compound (11) | " | 2 |
| 115 ( " ) | " (46) | " | 2 |

Specimens 101 to 105, and 111 to 115 were uniformly exposed to light of 200 lux for 1/100 second, and then developed in accordance with Processing Method (A) described below. The specimens thus developed were then examined for face quality in the same manner as described above. Specimens 104, 105, 114 and 115 of the present invention were thus reconfirmed less subject to face disorder than the comparative specimens. The Processing Method (B), described below, also provided the same results.

Processing Method A

| Step | Time | Temperature | Replenishment rate* | Tank capacity |
|---|---|---|---|---|
| Color development | 3 min. 15 sec. | 38°C | 33 ml | 20 ℓ |
| Bleach | 6 min. 30 sec. | 38°C | 25 ml | 40 ℓ |
| Rinse | 2 min. 10 sec. | 24°C | 1,200 ml | 20 ℓ |
| Fixing | 4 min. 20 sec. | 38°C | 25 ml | 30 ℓ |
| Rinse (1) | 1 min. 05 sec. | 24°C | ** | 10 ℓ |
| Rinse (2) | 1 min. 00 sec. | 24°C | 1,200 ml | 10 ℓ |
| Stabilization | 1 min. 05 sec. | 38°C | 25 ml | 10 ℓ |
| Drying | 4 min. 20 sec. | 55°C | | |

* Conducted per 35-mm width and 1-m length

** The rinse step was effected in a counter-current process wherein the washing water flows (2) to (1).

The various processing solutions employed in Method A had the follow-ing compositions:

Fixing Solution

| | Mother solution (g) | Replenisher (g) |
|---|---|---|
| Disodium ethylenediamine-tetraacetate | 0.5 | 0.7 |
| Sodium sulfite | 7.0 | 8.0 |
| Sodium bisulfite | 5.0 | 5.5 |
| 70 % Aqueous solution of ammonium thiosulfate | 170.0 ml | 200.0 ml |
| Water to make | 1.0 ℓ | 1.0 ℓ |
| pH | 6.7 | 6.6 |

Stabilizing Solution

| | Mother solution (g) | Replenisher (g) |
|---|---|---|
| 37 % Formalin | 2.0 ml | 3.0 ml |
| Polyoxyethylene-p-monononylphenylether (mean polymerization degree: 10) | 0.3 | 0.45 |
| Disodium ethylenediamine-tetraacetate | 0.05 | 0.08 |
| Water to make | 1.0 ℓ | 1.0 ℓ |
| pH | 5.0 - 8.0 | 5.0 - 8.0 |

Color Developer

| | Mother solution (g) | Replenisher (g) |
|---|---|---|
| Diethylenetriaminepenta-aceticacetic acid | 1.0 | 1.1 |

| | | |
|---|---|---|
| 1-Hydroxyethylidene-1,1-diphosphonic acid | 3.0 | 3.2 |
| Sodium sulfite | 4.0 | 4.4 |
| Potassium carbonate | 30.0 | 37.0 |
| Potassium bromide | 1.4 | 0.7 |
| Potassium iodide | 1.5 mg | -- |
| Hydroxylamine sulfate | 2.4 | 2.8 |
| 4-[N-ethyl-N-B-hydroxylethylamino]-2-methylaniline sulfate | 4.5 | 5.5 |
| Water to make | 1.0 ℓ | 1.0 ℓ |
| pH | 10.05 | 10.10 |

Bleaching Solution

| | Mother solution (g) | Replenisher (g) |
|---|---|---|
| Ferric sodium ethylenediaminetetraacetate trihydrate | 100.0 | 120.0 |
| Disodium ethylenediaminetetraacetate | 10.0 | 11.0 |
| Ammonium bromide | 140.0 | 160.0 |
| Ammonium nitrate | 30.0 | 35.0 |
| 27 % Aqueous ammonia | 6.5 ml | 4.0 ml |
| Water to make | 1.0 ℓ | 1.0 ℓ |
| pH | 6.0 | 5.7 |

### Processing Method B

| Step | Time | Temperature | Replenishment rate* | Tank capacity |
|---|---|---|---|---|
| Color development | 3 min. 15 sec. | 38°C | 45 ml | 10 ℓ |
| Bleach | 1 min. 00 sec. | 38°C | 20 ml | 4 ℓ |
| Blix | 3 min. 15 sec. | 38°C | 30 ml | 8 ℓ |
| Rinse (1) | 40 sec. | 35°C | ** | 4 ℓ |
| Rinse (2) | 1 min. 00 sec. | 35°C | 30 ml | 4 ℓ |
| Stabilization | 40 sec. | 38°C | 20 ml | 4 ℓ |
| Drying | 1 min. 15 sec. | 55°C | | |

* Conducted per 35-mm width and 1-m length

** The rinse step was effected in a counter-current process wherein the washing water flows (2) to (1).

The various processing solutions employed in Method B had the follow-ing compositions:

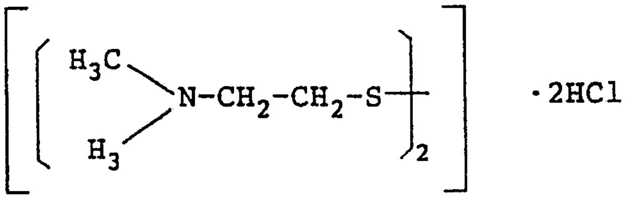
Color Developer

| | Mother solution (g) | Replenisher (g) |
|---|---|---|
| Diethylenetriaminepenta-acetic acid | 1.0 | 1.1 |
| 1-Hydroxyethylidene-1,1-diphosphonic acid | 3.0 | 3.2 |
| Sodium sulfite | 4.0 | 4.4 |
| Potassium carbonate | 30.0 | 37.0 |

| | | |
|---|---|---|
| Potassium bromide | 1.4 | 0.7 |
| Potassium iodide | 1.5 mg | - |
| Hydroxylamine sulfate | 2.4 | 2.8 |
| 4-[N-ethyl-N-β-hydroxylethylamino]-2-methylaniline sulfate | 4.5 | 5.5 |
| Water to make | 1.0 ℓ | 1.0 ℓ |
| pH | 10.05 | 10.10 |

<u>Bleaching Solution</u>

| | Mother solution (g) | Replenisher (g) |
|---|---|---|
| Ferric ammonium ethylenediaminetetraacetate dihydrate | 120.0 | (Same as Mother Solution) |
| Disodium ethylenediaminetetraacetate | 10.0 | |
| Ammonium bromide | 100.0 | |
| Ammonium nitrate | 10.0 | |
| Bleach accelerator | 0.005 mol | |



| | | |
|---|---|---|
| 27 % Aqueous ammonia | 15.0 ml | |
| Water to make | 1.0 ℓ | |
| pH | 6.3 | |

Blix Solution

| | Mother solution (g) | Replenisher (g) |
|---|---|---|
| Ferric ammonium ethylenediaminetetraacetate dihydrate | 50.0 | (Same as Mother Solution) |
| Disodium ethylenediaminetetraacetate | 5.0 | |
| Sodium sulfite | 12.0 | |
| 70% Aqueous solution of ammonium thiosulfate | 240 ml | |
| 27% Aqueous ammonia | 6.0 ml | |
| Water to make | 1.0 ℓ | |
| pH | 7.2 | |

Washing Solution (The mother solution was used also as replenisher)

Tap water was passed through a mixed bed column packed with an H-type strongly acidic cation exchange resin (Amberlite IR-120B manufactured by Rohm & Haas Co.) and an OH-type strongly basic anion exchange resin (Amberlite IRA-400 manufactured by the same company) so that the calcium and magnesium ion concentrations were each reduced to 3 mg/ℓ or less. Dichlorinated sodium isocyanurate and sodium sulfate were then added to the solution in amounts of 20 mg/ℓ and 0.15 g/ℓ, respectively. The washing solution thus obtained had a pH value of 6.5 to 7.5.

Stabilizing solution

(The mother solution was used also as replenisher)

| | |
|---|---|
| 37 % Formalin | 2.0 ml |
| Polyoxyethylene-p-monononylphenylether (mean polymerization degree: 10) | 0.3 g |
| Disodium ethylenediaminetetraacetate | 0.05 g |
| Water to make | 1.0 ℓ |
| pH | 6.3 |

EXAMPLE 2

Specimen 201 was prepared in the same manner as in Comparative Specimen 101 in Example 1, except that Compound Cpd-11 incorporated in the 1st to 14th layers was replaced by Cpd-12 in amounts as set forth in Table 2. Furthermore, Specimen 211 was prepared in the same manner as in Specimen 201 except that the retention time of emulsion coating solutions during coating of the 3rd, 4th and 5th layers was altered as set forth in Table 3. The switching from Cpd-11 to Cpd-12 did not give any deterioration in face quality in Specimens 201 and 211.

Specimens 201 and 211 were evaluated for face quality in the same manner as in Example 1. The results are set forth in Table 3.

Table 3 shows that the specimens comprising the present compound Cpd-12 are not subject to face disorder due to retention ageing and exhibit a high stable face quality.

Specimens 101, 111, 201 and 211 were uniformly exposed to light of 200 lux for 1/100 second, and then developed in accordance with Processing Method (A). The specimens thus developed were then examined for face quality in the same manner as described above. Specimens 201 and 211 comprising the present compounds were thus reconfirmed less subject to face disorder than the comparative specimens. Processing Method (B) also provided the same results.

Table 2

| | Coated amount of Cpd-12 in Specimen 201 (mg/$m^2$) |
|---|---|
| 1st Layer | 1.5 |
| 2nd Layer | 1.5 |
| 3rd Layer | 1.0 |
| 4th Layer | 1.3 |
| 5th Layer | 1.0 |
| 6th Layer | 1.0 |
| 7th Layer | 0.4 |
| 8th Layer | 1.0 |
| 9th Layer | 0.8 |
| 10th Layer | 0.6 |
| 11th Layer | 1.0 |
| 12th Layer | 0.6 |
| 13th Layer | 0.8 |
| 14th Layer | 0.9 |

Table 3

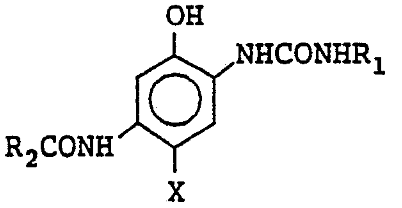
| Specimen No. | Cpd-11 or substitute | Retention time in 3rd, 4th, 5th layers | Number of cometts per $m^2$ |
|---|---|---|---|
| 101 (comparative) | Cpd-11 | 0.5 hour | 7 |
| 111 ( " ) | Cpd-11 | 10 hours | 18 |
| 201 (present invention) | Cpd-12 | 0.5 hour | 4 |
| 211 ( " ) | Cpd-12 | 10 hours | 6 |

Thus, the multilayer color photographic light-sensitive materials of the present invention exhibit extremely excellent face qualities.

While the invention has been described in detail and with reference to specific embodiments thereof, it will be apparent to one skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope thereof.

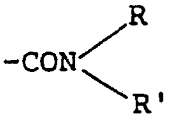
## Claims

**1.** A silver halide color photographic material comprising at least one blue-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one red-sensitive silver halide emulsion layer on a support, wherein at least 10 layers comprising at least one of the silver halide emulsion layers are coated simultaneously in one operation, and said at least one red-sensitive silver halide emulsion layer contains at least one cyan coupler represented by general formula (I):



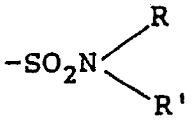
(I)

wherein X represents a hydrogen atom or a group capable of being released upon coupling with an oxidation product of an aromatic primary amine color developing agent; $R_1$ represents a naphthyl group, a heterocyclic group with the proviso that a nitrogen atom in the ureido group is connected to a carbon atom in the heterocyclic group, or $R_1$ represents a phenyl group containing at least one substituent selected from the group consisting of a trifluoromethyl group, a nitro group, a cyano group, an alkyl group, an aryl group, a halogen atom, an amino group, a hydroxy group, -COR, -COOR, $-SO_2R$, $-SO_2OR$,



$$-CON\begin{matrix} R \\ R' \end{matrix}$$

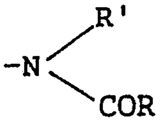
,



$$-SO_2N\begin{matrix} R \\ R' \end{matrix}$$

,

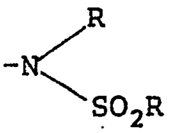
-OR, -OCOR,



$$-N\begin{matrix} R' \\ COR \end{matrix}$$

,

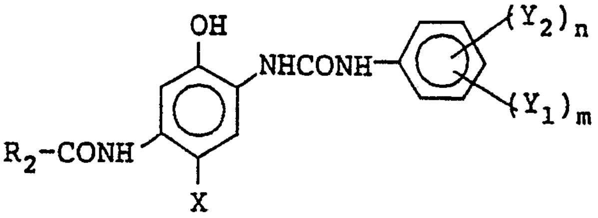
and



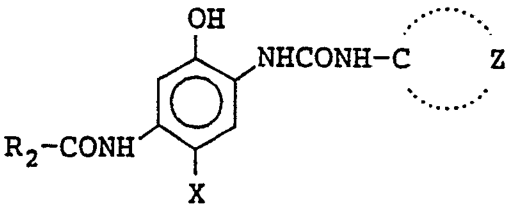
$$-N\begin{matrix} R \\ SO_2R \end{matrix}$$

(in which R represents an alkyl group or an aryl group, R' represents a hydrogen atom, an alkyl group or an aryl group, and R and R' may be connected to each other to form a ring), with the proviso that if a cyano group is present on the phenyl group in the p-position with respect to the ureido group, the phenyl group does not contain hydrogen atoms in four positions of o-positions and m-positions at the same time; and $R_2$ represents an alkyl group or an aryl group required to render a cyan coupler represented by the general formula (I) and a cyan dye produced therefrom nondiffusive.

**2.** A silver halide color photographic material as claimed in claim 1, wherein said cyan coupler is selected from the group consisting of compounds represented by general formula (Ia) or (Ib):

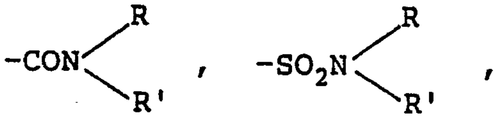


(Ia)



(Ib)

wherein Y₁ represents a trifluoromethyl group, a nitro group, a cyano group, -COR, -COOR, $-SO_2R$, $-SO_2OR$,

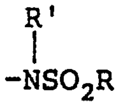


$$-CON\begin{matrix}R\\R'\end{matrix}, \quad -SO_2N\begin{matrix}R\\R'\end{matrix},$$

-OR, -OCOR,

$$\overset{R'}{\overset{|}{-NCOR}}$$

or



$$\overset{R'}{\overset{|}{-NSO_2R}}$$

(wherein R represents an alkyl group or an aryl group; R' represents a hydrogen atom or a group represented by R; R and R' may be connected to each other to form a ring);

$Y_2$ represents a monovalent group;

suffix m represents an integer of 1 to 3, and the suffix n represents an integer of 0 to 3, with the proviso that m and n satisfy the relationship $m + n \leq 5$, and if a cyan group is present on the phenyl group in the p-position with respect to the ureido group, m and n satisfy the relationship $2 \leq m + n \leq 5$;

Z represents a nonmetallic atom group required to form a heterocyclic group or naphthyl group;

$R_2$ represents an alkyl or aryl group required to render a cyan coupler represented by general formula (I) and a cyan dye produced therefrom nondiffusive.

3. A silver halide color photographic material as claimed in claim 2, wherein said monovalent group represented by $Y_2$ is an alkyl group, an aryl group, a halogen atom, an amino group, a hydroxyl group or a substituent represented by $Y_1$.

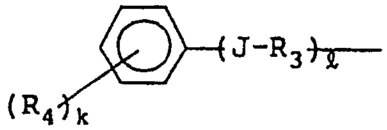
**4.** A silver halide color photographic material as claimed in claim 2, wherein said heterocyclic group comprising Z is a 5- or 6-membered heterocyclic group containing at least one of N, O and S atoms as a hetero atom, said heterocyclic group may be condensed with a benzene ring.

**5.** A silver halide color photographic material as claimed in claim 4, wherein said heterocyclic group is a furyl group, a thienyl group, a pyridyl group, a quinolyl group, ab oxazolyl group, a tetrazolyl group, a benzothiazolyl group, or a tetrahydrofuranyl group.

**6.** A silver halide color photographic material as claimed in claim 4, wherein said heterocyclic group has at least one substituent selected from the group consisting of a $C_{1-10}$ alkyl group, an aryl group, a halogen atom, a cyano group, a nitro group, a sulfonamido group, a sulfamoyl group, a sulfonyl group, a fluorosulfonyl group, a carbamoyl group, an oxycarbonyl group, an acyl group, a heterocyclic group, an alkoxy group, and an aryloxy group.

**7.** A silver halide color photographic material as claimed in claim 2, wherein said naphthyl group comprising Z has at least one substituent selected from the group consisting of a $C_{1-10}$ alkyl group, an aryl group, a halogen atom, a cyano group, a nitro group, a sulfonamido group, a sulfamoyl group, a sulfonyl group, a fluorosulfonyl group, a carbamoyl group, an oxycarbcnyl group, an acyl group, a heterocyclic group, an alkoxy group, and an aryloxy group.

**8.** A silver halide color photographic material as claimed in claim 2, wherein $R_2$ represents a $C_{4-30}$ alkyl group, a phenyl group, and a group represented by the general formula [Ic]:



(Ic)

wherein J represents an oxygen atom or a sulfur atom; k represents an integer of 0 to 4 (when k is 2 or more, the two or more $R_4$'s may be the same or different); $\ell$ represents an integer 0 or 1; $R_3$ represents a $C_{1-20}$ straight-chain or branched alkylene group; and $R_4$ represents a monovalent group.

**9.** A silver halide color photographic material as claimed in claim 8, wherein said monovalent group represented by $R_4$ is a halogen atom, an alkyl group, an aryl group, a heterocyclic group, an alkoxy group, an aryloxy group, a hydroxyl group, an acyloxy group, a carboxyl group, an alkoxycarbonyl group, an aryloxycarbonyl group, an alkylthio group, an acyl group, an acylamino group, a sulfonamide group, a carbamoyl group, or a sulfamoyl group.

**10.** A silver halide color photographic material as claimed in claim 2, wherein X represents a hydrogen atom, a halogen atom, a group having an oxygen or nitrogen atom directly bonded to the coupling position.

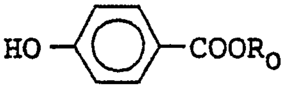
**11.** A silver halide color photographic material as claimed in claim 2, wherein said group having an oxygen or nitrogen atom directly bonded to the coupling position is an aryloxy group, a carbamoyloxy group, carbamoylmethoxy group, an acyloxy group, a sulfonamido group, or a succinic imido group.

**12.** A silver halide color photographic material as claimed in claim 1, wherein said at least 10 layers include the red-sensitive silver halide emulsion layer containing the cyan coupler represented by general formula (I).

**13.** A silver halide color photographic material as claimed in claim 1, wherein said cyan coupler is incorporated in an amount of 0.02 to 2 g/m$^2$.

**14.** A silver halide color photographic material as claimed in claim 1, wherein a naphthol cyan coupler is incorporated in the red-sensitive emulsion layer containing the cyan coupler represented by formula (I) in an amount of not more than 0.2 g/m$^2$.

**15.** A silver halide color photographic material comprising at least one blue-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one red-sensitive silver halide emulsion layer on a support, wherein at least 10 layers comprising at least one of the silver halide emulsion layers are coated simultaneously in one operation, and at least one layer in the photographic material contains at least one compound represented by the general formula [II]:



(II)

wherein $R_0$ represents a $C_{1-5}$ alkyl group.

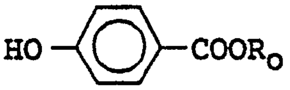
**16.** A silver halide color photographic material as claimed in claim 15, wherein $R_0$ represents n-propyl group or n-butyl group.

**17.** A silver halide color photographic material as claimed in claim 15, wherein said compound is incorporated into a layer containing a cyan coupler.

**18.** A silver halide color photographic material as claimed in claim 15, wherein said compound is incorporated in an amount of 0.1 to 10 mg per g of dried gelatin in the layer containing the compound.

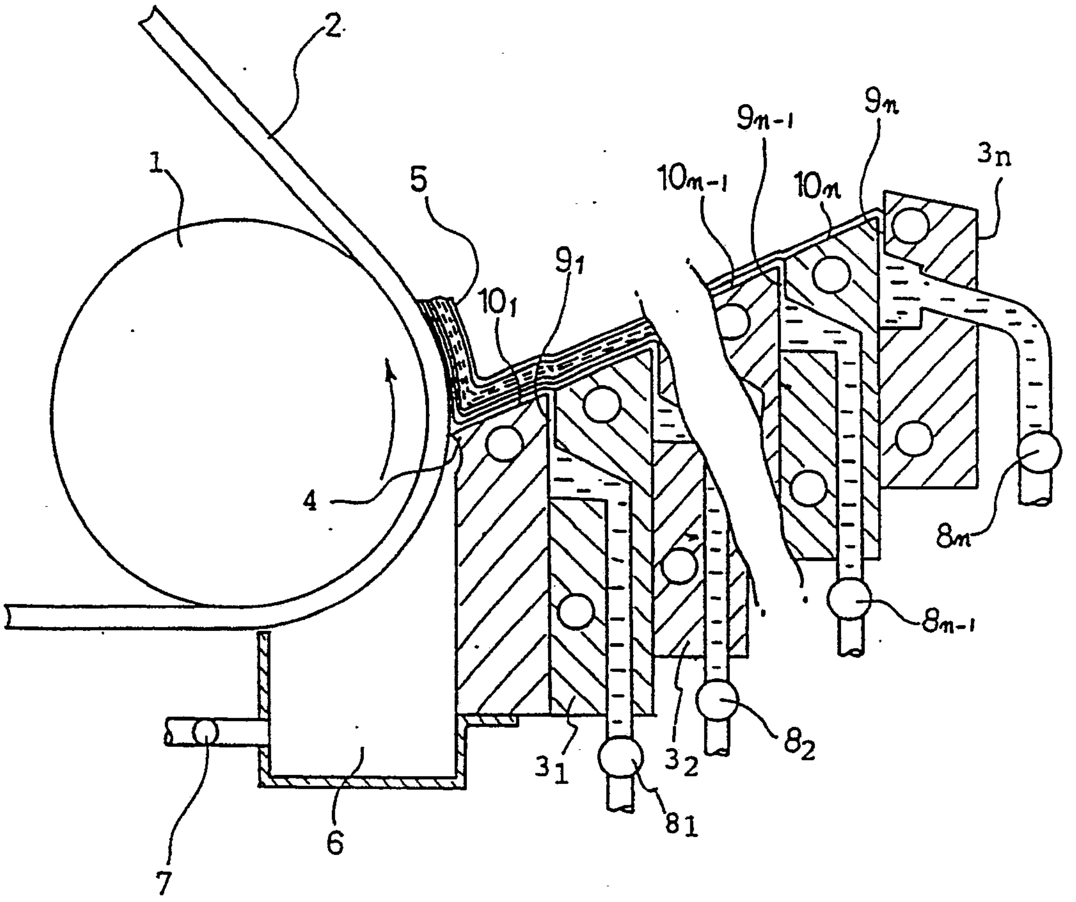
**19.** A silver halide color photographic material as claimed in claim 15, wherein said at least 10 layers include the layer containing the compound.

**20.** A silver halide color photographic material as claimed in claim 1, wherein said photographic material contains at least one compound represented by general formula (II):



(II)

wherein $R_0$ represents a $C_{1-5}$ alkyl group.


2
1
5
$10_1$
$9_1$
4
$9_{n-1}$
$9_n$
$10_{n-1}$
$10_n$
$3_n$
$8_n$
$8_{n-1}$
$8_2$
$3_2$
$3_1$
$8_1$
6
7