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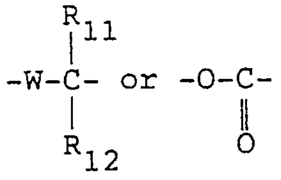
(54) Silver halide color photographic material.

(57) A novel silver halide color photographic material is provided comprising on a support at least one silver halide emulsion layer, wherein the material contains a compound represented by general formula (I):

$A\text{-}L_1\text{-}L_2\text{-}INH\text{-}(CN_2)_n\text{-}Q$ (I)

wherein A represents a coupler residue excepting 1H-pyrazolo[1,5-b]-1,2,4-triazole and 1H-pyrazolo[5,1-c]-1,2,4-triazole; L_1 represents



$$-W-\underset{R_{12}}{\overset{R_{11}}{C}}- \quad \text{or} \quad -O-\underset{O}{\underset{\|}{C}}-$$

in which W represents an oxygen atom, a sulfur atom or a tertiary amino group, and R_{11} and R_{12} each independently represents a hydrogen atom or a substituent; L_2 represents a group which undergoes electron migration along a conjugated system to release $INH\text{-}(CH_2)_n\text{-}Q$; INH represents a development inhibitor residue bonded to L_2 via a hetero atom; n represents an integer of 0 to 3; and Q represents a group having a molecular weight of 80 to 250.

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SILVER HALIDE COLOR PHOTOGRAPHIC MATERIAL

FIELD OF THE INVENTION

The present invention relates to a silver halide color photographic material comprising a novel compound capable of releasing, at an appropriate time during development, a development inhibitor and having excellent graininess, sharpness and preservability.

BACKGROUND OF THE INVENTION

In the field of silver halide photographic materials, particularly for photographing, photographic materials having a high sensitivity such as an ISO sensitivity of 100 as in ISO 400 (Super HG-400 manufactured by Fuji Photo Film Co., Ltd.) and having excellent graininess, sharpness and preservability have been desired.

As examples of a compound which improves sharpness without deteriorating the preservability of light-sensitive materials, compounds which imagewise release a development inhibitor via two or more timing groups are described in JP-A-60-218645, JP-A-60-249148, and JP-A-61-156127 (the term "JP-A" as used herein refers to a "published unexamined Japanese patent application"), and U.S. Patent 4,861,701. However, these compounds do not provide a satisfactory improvement in sharpness and graininess due to their inappropriate speed (timing) of releasing a development inhibitor or due to the excessive dispersibility of the released development inhibitor. Most of the light-sensitive materials comprising these compounds are disadvantageous in that when allowed to stand for a prolonged period of time between exposure to light and development, or when exposed to an elevated temperature and a high humidity, they suffer from an increase in fogging and a drop in sensitivity.

European Patent Publication 348,139 discloses couplers capable of releasing a development inhibitor in a specified structure so that sharpness can be improved without heightening interimage effect. These couplers enable some improvement in sharpness. However, these couplers are disadvantageous in that their speed of releasing a development inhibitor cannot easily be controlled, which results in an unsatisfactory improvement in sharpness and causing some fluctuation in photographic properties with time between exposure and development, especially in conditions of high temperature and humidity.

SUMMARY OF THE INVENTION

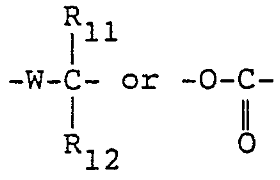
It is an object of the present invention to provide a silver halide color photographic material which exhibits excellent sharpness and graininess and little fluctuation in photographic properties during aging between photographing (exposure) and development.

It is another object of the present invention to provide a silver halide color photographic material in which the rate of releasing development inhibitor can be controlled easily.

To achieve the above objects, the present invention provides a silver halide color photographic material comprising on a support at least one silver halide emulsion layer, wherein the material contains a compound represented by the general formula (I):

$A\text{-}L_1\text{-}L_2\text{-}INH\text{-}(CH_2)_n\text{-}Q$ (I)

wherein A represents a coupler residue excepting 1H-pyrazolo[1,5-b]-1,2,4-triazole and 1H-pyrazolo[5,1-c]-1,2,4-triazole; L_1 represents



$$-W-\overset{R_{11}}{\underset{R_{12}}{C}}- \quad \text{or} \quad -O-\underset{\underset{O}{\|}}{C}-$$

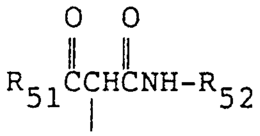
in which W represents an oxygen atom, a sulfur atom or a tertiary amino group, and R_{11} and R_{12} each independently represents a hydrogen atom or a substituent; L_2 represents a group which undergoes electron migration along a conjugated system to release $INH\text{-}(CH_2)_n\text{-}Q$; INH represents a development inhibitor residue bonded to L_2 via a hetero atom; n represents an integer of 0 to 3; and Q represents a group having a molecular weight of 80 to 250.

DETAILED DESCRIPTION OF THE INVENTION

In general formula (I), A represents a coupler residue excepting 1H-pyrazolo[1,5-b]-1,2,4-triazole and 1H-pyrazolo[5,1-c]-1,2,4-triazole.

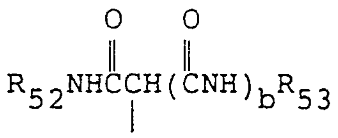
Examples of the coupler residue include yellow coupler residues (e.g., closed chain ketomethylene), magenta coupler residues (e.g., 5-pyrazolone, pyrazoloimidazole), cyan coupler residues (e.g., phenolic, naphtholic), and colorless coupler residues (e.g., indanone, acetophenone). Furthermore, heterocyclic coupler residues as disclosed in U.S. Patents 4,315,070, 4,183,752, 3,961,959, and 4,171,223 may be used.

Preferred examples of coupler residues represented by A include those represented by general formulae (Cp-1), (Cp-2), (Cp-3), (Cp-6), (Cp-7), (Cp-8), (Cp-9), and (Cp-10). These coupler residues are advantageous in that they undergo coupling at a high speed.



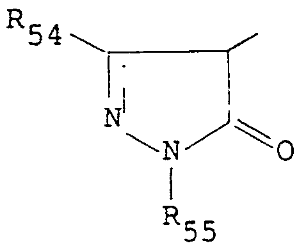
$$R_{51}\overset{\overset{O}{\|}}{C}\underset{|}{C}H\overset{\overset{O}{\|}}{C}NH{-}R_{52}$$

(Cp-1)

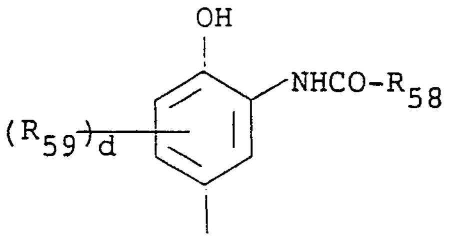


$$R_{52}NH\overset{\overset{\displaystyle O}{\|}}{C}\underset{|}{C}H(\overset{\overset{\displaystyle O}{\|}}{C}NH)_{b}R_{53}$$

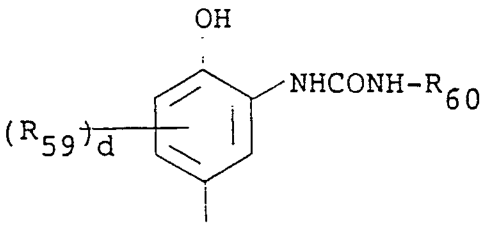
(Cp-2)



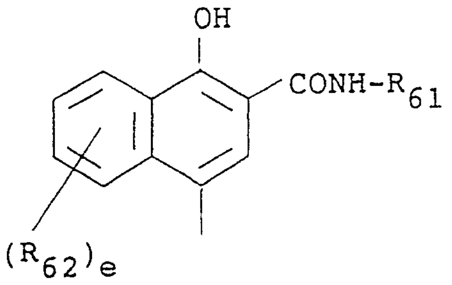
(Cp-3)



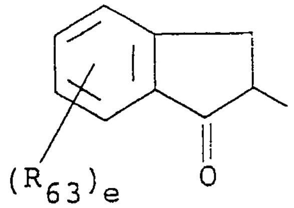
(Cp-6)



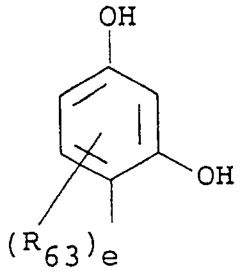
(Cp-7)



(Cp-8)



(Cp-9)



(Cp-10)

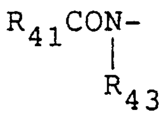
In the above general formulae, the free bonds in the coupling position each represents a position to which a coupling separable group is bonded.

In the above general formulae, if R_{51}, R_{52}, R_{53}, R_{54}, R_{55}, R_{58}, R_{59}, R_{60}, R_{61}, R_{62} or R_{63} contains a nondiffusible group, the total number of carbon atoms contained in the coupler residue is 8 to 40, preferably 10 to 30. If no nondiffusible group is present, the total number of carbon atoms contained in the coupler residue is preferably 15 or less. In the case of a bis type, telomer type or polymer type couplers, any one of the above mentioned substituents represents a divalent group which connects repeating units. In this case, the number of carbon atoms may deviate from the above disclosed range.

R_{51} to R_{55}, R_{58} to R_{63}, b, d and e will be further described hereinafter.

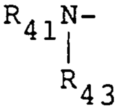
R_{41} represents an aliphatic group, an aromatic group or a heterocyclic group; R_{42} represents an aromatic group or a heterocyclic group; and R_{43}, R_{44} and R_{45} each represents a hydrogen atom, an aliphatic group, an aromatic group or a heterocyclic group.

R_{51} has the same meaning as R_{41}. The suffix b represents an integer of 0 or 1. R_{52} and R_{53} each has the same meaning as R_{42}. R_{54} has the same meaning as R_{41} or represents an



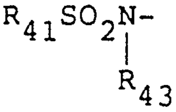
$$R_{41}CO\underset{\displaystyle R_{43}}{\underset{|}{N}}-$$

group, an



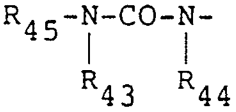
$R_{41}\underset{R_{43}}{\underset{|}{N}}-$

group, an



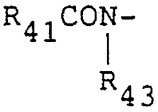
$R_{41}SO_2\underset{R_{43}}{\underset{|}{N}}-$

group, an $R_{41}S-$ group, an $R_{43}O-$ group, an



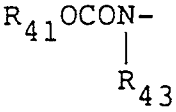
$R_{45}-\underset{R_{43}}{\underset{|}{N}}-CO-\underset{R_{44}}{\underset{|}{N}}-$

group or an N≡C- group. R_{55} has the same meaning as R_{41}. R_{58} has the same meaning as R_{41}. R_{59} has the same meaning as R_{41} or represents an



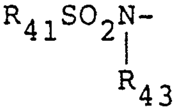
$R_{41}CO\underset{R_{43}}{\underset{|}{N}}-$

group, an



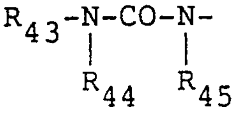
$R_{41}OCO\underset{R_{43}}{\underset{|}{N}}-$

group, an



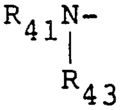
$R_{41}SO_2\underset{R_{43}}{\underset{|}{N}}-$

group, an



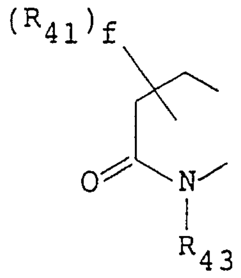
$R_{43}-\underset{R_{44}}{\underset{|}{N}}-CO-\underset{R_{45}}{\underset{|}{N}}-$

group, an $R_{41}O-$ group, an $R_{41}S-$ group, a halogen atom, or an

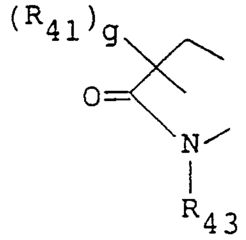


$R_{41}\underset{R_{43}}{\underset{|}{N}}-$

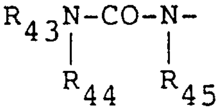
group. The suffix d represents an integer of 0 to 3. When d is plural, each R_{59} represents the same or different substituents. Alternatively, each R_{59} may be a divalent group and may be connected to each other to form a cyclic structure. Typical examples of divalent groups to be used for the formation of a cyclic structure include an



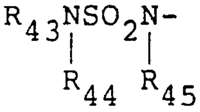
group, or an



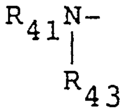
group, wherein f represents an integer of 0 to 4; and g represents an integer of 0 to 2. R_{60} has the same meaning as R_{41}. R_{61} has the same meaning as R_{41}. R_{62} has the same meaning as R_{41} or represents an $R_{41}OCONH$- group, an


$R_{43}\underset{R_{44}}{N}\text{-CO-}\underset{R_{45}}{N}\text{-}$

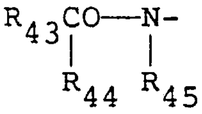
group, an


$R_{43}\underset{R_{44}}{N}SO_2\underset{R_{45}}{N}\text{-}$

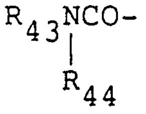
group, an $R_{43}O$- group, an $R_{41}S$- group, a halogen atom or an


$R_{41}\underset{R_{43}}{N}\text{-}$

group. R_{63} has the same meaning as R_{41} or represents an

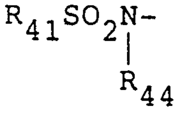

$R_{43}\underset{R_{44}}{CO}\text{—}\underset{R_{45}}{N}\text{-}$

group, an



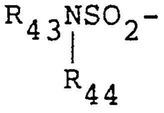
$R_{43}\underset{\substack{|\\R_{44}}}{N}CO-$

group, an



$R_{41}SO_2\underset{\substack{|\\R_{44}}}{N}-$

group, an



$R_{43}\underset{\substack{|\\R_{44}}}{N}SO_2-$

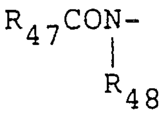
group, an $R_{41}SO_2$- group, an $R_{43}OCO$- group, an $R_{43}O$-SO_2-group, a halogen atom, a nitro group, a cyano group or an $R_{43}CO$- group. The suffix e represents an integer of 0 to 4. When there are a plurality of R_{62}'s or R_{63}'s, each R_{62} or R_{63} may be the same or different.

The above mentioned aliphatic group represented by R_{41} and R_{43} to R_{45} is a C_{1-32}, preferably a C_{1-22} saturated or unsaturated, straight chain or branched chain or cyclic, substituted or unsubstituted aliphatic hydrocarbon group. Typical examples of such an aliphatic hydrocarbon group include methyl, ethyl, propyl, isopropyl, butyl, t-butyl, i-butyl, t-amyl, hexyl, cyclohexyl, 2-ethylhexyl, octyl, 1,1,3,3-tetramethylbutyl, decyl, dodecyl, hexadecyl, and octadecyl.

The above mentioned aromatic group represented by R_{41} to R_{45} is a C_{6-20}, preferably a substituted or unsubstituted phenyl group or a substituted or unsubstituted naphthyl group.

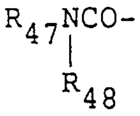
The above mentioned heterocyclic group represented by R_{41} to R_{45} is a C_{1-20}, preferably a C_{1-7} 3-to 8-membered substituted or unsubstituted heterocyclic group containing a hetero atom selected from a nitrogen atom, an oxygen atom and a sulfur atom. Typical examples of such a heterocyclic group include 2-pyridyl, 2-thienyl, 2-furyl, 1,3,4-thiadiazole-2-yl, 2,4-dioxo-1,3-imidazolidine-5-yl, 1,2,4-triazole-2-yl, and 1-pyrazolyl.

Typical examples of substituents to be contained in the above mentioned substituted aliphatic hydrocarbon group, aromatic group and heterocyclic group include a halogen atom, an $R_{47}O$- group, an $R_{46}S$- group, an



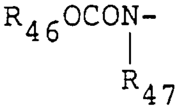
$R_{47}CO\underset{\substack{|\\R_{48}}}{N}-$

group, an



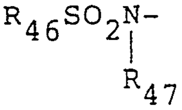
$R_{47}\underset{\substack{|\\R_{48}}}{N}CO-$

group, an



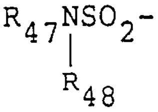
$R_{46}OCON(R_{47})-$

group, an



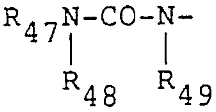
$R_{46}SO_2N(R_{47})-$

group, an



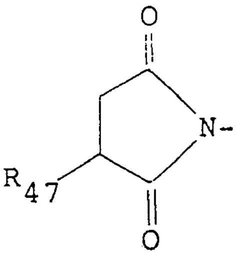
$R_{47}N(R_{48})SO_2-$

group, an $R_{46}SO_2$- group, an $R_{47}OCO$- group, an



$R_{47}N(R_{48})-CO-N(R_{49})-$

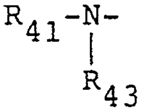
group, an R_{46} group, an



group, an $R_{46}COO$- group, an $R_{47}OSO_2$-group,a cyano group, and a nitro group, in which R_{46} represents an aliphatic group, an aromatic group or a heterocyclic group, and R_{47}, R_{48} and R_{49} each represents an aliphatic group, an aromatic group, a heterocyclic group or a hydrogen atom. The aliphatic group, aromatic group or heterocyclic group represented by R_{46}, R_{47} and R_{48} is as defined above for R_{41} to R_{45}.

Preferred examples of R_{51} to R_{55}, R_{58} to R_{63}, d and e will be described hereinafter.

R_{51} is preferably an aliphatic or aromatic group. R_{52}, R_{53} and R_{55} are preferably aromatic groups. R_{54} is preferably an $R_{41}CONH$- group or an



$R_{41}-N(R_{43})-$

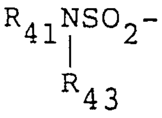
group. R_{58} is preferably an aliphatic group or an aromatic group.

In general formula (Cp-6), R_{59} is preferably a chlorine atom, an aliphatic group or an $R_{41}CONH$- group. The suffix d is preferably 1 or 2. R_{60} is preferably an aromatic group.

In general formula (Cp-7), R_{59} is preferably an $R_{41}CONH$- group. In general formula (Cp-7), the suffix d is preferably 1.

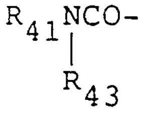
In general formula (Cp-8), R_{61} is preferably an aliphatic group or an aromatic group. In general formula (Cp-8), the suffix e is preferably 0 or 1. R_{62} is preferably an $R_{41}OCONH$- group, an $R_{41}CONH$- group or an $R_{41}SO_2NH$- group. R_{62} preferably substitutes for the hydrogen atom in the 5-position of the naphthol ring.

In general formula (Cp-9), R_{63} is preferably an $R_{41}CONH$- group, an $R_{41}SO_2NH$- group, an



$$R_{41}\underset{\displaystyle R_{43}}{\underset{|}{N}}SO_2-$$

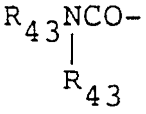
group, an $R_{41}SO_2$- group, an



$$R_{41}\underset{\displaystyle R_{43}}{\underset{|}{N}}CO-$$

group, a nitro group or a cyano group. In general formula (Cp-9), the suffix e is preferably 1 or 2.

In general formula (Cp-10), R_{63} is preferably an



$$R_{43}\underset{\displaystyle R_{43}}{\underset{|}{N}}CO-$$

group, an $R_{43}CCO$- group or an $R_{43}CO$- group. In general formula (Cp-10), the suffix e is preferably 1 or 2.

Typical examples of R_{51} to R_{55} and R_{58} to R_{63} will be further described hereinafter.

Examples of R_{51} include a t-butyl group, a 4-methoxyphenyl group, a phenyl group, a 3-[2-(2,4-di-t-amylphenoxy)butanamido]phenyl group, and a methyl group.

Examples of R_{52} and R_{53} include a phenyl group, a 2-chloro-5-ethoxy group, a 2-chloro-5-dodecyloxycarbonylphenyl group, a 2-chloro-5-hexadecylsulfonamidophenyl group, a 2-chloro-5-tetradecanamidophenyl group, a 2-chloro-5-[4-(2,4-di-t-amylphenoxy)butanamido]phenyl group, a 2-chloro-5-[2-(2,4-di-t-amylphenoxy)butanamido]phenyl group, a 2-methoxyphenyl group, a 2-methoxy-5-tetradecyloxycarbonylphenyl group, a 2-chloro-5-(1-ethoxycarbonylethoxycarbonyl)phenyl group, a 2-pyridyl group, a 2-chloro-5-octyloxycarbonylphenyl group, a 2,4-dichlorophenyl group, a 2-chloro-5-(1-dodecyloxycarbonylethoxycarbonyl)phenyl group, a 2-chlorophenyl group, and a 2-ethoxyphenyl group.

Examples of R_{54} include a butanoylamino group, a 2-chloro-3-propanoylaminoanilino group, a 3-[2-(2,4-di-t-amylphenoxy)butanamido]benzamide group, a 3-[4-(2,4-di-t-amylphenoxy)butanamido]benzamide group, a 2-chloro-5-tetradecanamidoaniline group, a 5-(2,4-di-t-amylphenoxyacetamido)benzamide group, a 2-chloro-5-dodecenylsuccinimidoanilino group, a 2-chloro-5-[2-(3-t-butyl-4-hydroxyphenoxy)tetradecanamido]-anilino group, a 2,2-dimethylpropanamide group, a 2-(3-pentadecylphenoxy)butanamide group, a pyrrolidino group, and an N,N-dibutylamino group.

Preferred examples of R_{55} include a 2,4,6-trichlorophenyl group, a 2-chlorophenyl group, a 2,5-dichlorophenyl group, a 2,3-dichlorophenyl group, a 2,6-dichloro-4-methoxyphenyl group, a 4-[2-(2,4-di-t-amylphenoxy)butanamido]phenyl group, and a 2,6-dichloro-4-methanesulfonylphenyl group.

Examples of R_{58} include a 2-chlorophenyl group, a pentafluorophenyl group, a heptafluoropropyl group, a 1-(2,4-di-t-amylphenoxy)propyl group, a 3-(2,4-di-t-amylphenoxy)propyl group, a 2,4-di-t-amylmethyl group, and a furyl group.

Examples of R_{59} include a chlorine atom, a methyl group, an ethyl group, a propyl group, a butyl group, an isopropyl group, a 2-(2,4-di-t-amylphenoxy)butanamide group, a 2-(2,4-di-t-amylphenoxy)-hexanamide group, a 2-(2,4-di-t-octylphenoxy)octanamide group, a 2-(2-chlorophenoxy)tetradecanamide group, a 2-[4-(4-hydroxyphenylsulfonyl)phenoxy]tetradecanamide group, and a 2-[2-(2,4-di-t-amylphenoxyacetamido)phenoxy]butanamide.

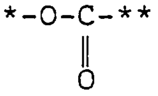
Examples of R_{60} include a 4-cyanophenyl group, a 2-cyanophenyl group, a 4-butylsulfonylphenyl group, a 4-propylsulfonylphenyl group, a 4-chloro-3-cyanophenyl group, a 4-ethoxycarbonylphenyl group, and a 3,4-dichlorophenyl group.

Examples of R_{61} include a propyl group, a 2-methoxyphenyl group, a dodecyl group, a hexadecyl group, a cyclohexyl group, a 3-(2,4-di-t-amylphenoxy)propyl group, a 4-(2,4-di-t-amylphenoxy)butyl group, a 3-dodecyloxypropyl group, a t-butyl group, a 2-methoxy-5-dodecyloxycarbonylphenyl group, and a 1-naphthyl group.

Examples of R_{62} include an isobutyloxycarbonylamino group, an ethoxycarbonylamino group, a phenylsulfonylamino group, a methanesulfonamide group, a benzamide group, a trifluoroacetamide group, a 3-phenylureido group, a butoxycarbonylamino group, and an acetamide group.

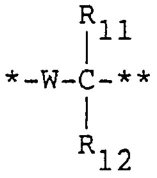
Examples of R_{63} include a 2,4-di-t-amylphenoxyacetamide group, a 2-(2,4-di-t-amylphenoxy)-butanamide group, a hexadecylsulfonamide group, an N-methyl-N-octadecylsulfamoyl group, a 4-t-octylbenzoyl group, a dodecyloxycarbonyl group, a chlorine atom, a nitro group, a cyano group, an N-[4-(2,4-di-t-amylphenoxy)butyl]carbamoyl group, an N-3-(2,4-di-t-amylphenoxy)propylsulfamoyl group, a methanesulfonyl group, and a hexadecylsulfonyl group.

In general formula (I), the group represented by L_1 is



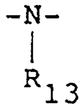
$$*\text{-O-}\underset{\underset{\displaystyle O}{\|}}{C}\text{-}**$$

or a group represented by general formula (T-1), in which * represents the position which is bonded to A in general formula (I), and ** represents the position which is bonded to L_2.



$$*\text{-W-}\overset{\overset{\displaystyle R_{11}}{|}}{\underset{\underset{\displaystyle R_{12}}{|}}{C}}\text{-}** \qquad (T\text{-}1)$$

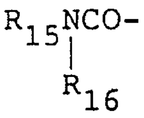
wherein W represents an oxygen atom, a sulfur atom or an



$$\text{-}\underset{\underset{\displaystyle R_{13}}{|}}{N}\text{-}$$

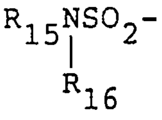
group; R_{11} and R_{12} each independently represents a hydrogen atom or a substituent; and R_{13} represents a substituent.

When R_{11} and R_{12} each independently represents a substituent, typical examples of such the substituent represented by R_{11} and R_{12} and typical examples of R_{13} include R_{15}, an $R_{15}CO$- group, an $R_{15}SO_2$- group, an



$$R_{15}\underset{\underset{\displaystyle R_{16}}{|}}{N}CO\text{-}$$

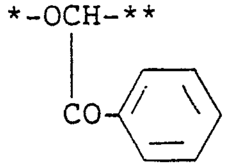
group, and an

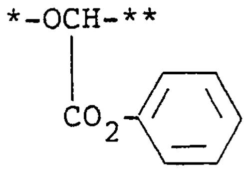


$$R_{15}\underset{\underset{\displaystyle R_{16}}{|}}{N}SO_2\text{-}$$

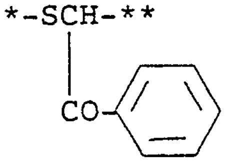
group in which R_{15} represents an aliphatic group (e.g., methyl, ethyl, propyl, butyl, isobutyl, sec-butyl, t-butyl, pentyl, isopropyl, neopentyl), an aromatic group (e.g., phenyl, 1-naphthyl, 2-naphthyl, p-chlorophenyl, o-chlorophenyl, p-nitrophenyl, o-methoxyphenyl, p-methoxyphenyl, p-hydroxyphenyl, p-carboxyphenyl) or a heterocyclic group (e.g., 2-pyridyl, 4-pyridyl, 2-furyl, 1-methyl-4-pyrazolyl, 2-thienyl) and R_{16} represents a hydrogen atom, an aliphatic group (e.g., methyl, ethyl, propyl, butyl, isobutyl, sec-butyl, t-butyl, pentyl, isopropyl, neopentyl), an aromatic group (e.g., phenyl, 1-naphthyl, 2-naphthyl, p-chlorophenyl, o-chlorophenyl, p-nitrophenyl, o-methoxyphenyl, p-methoxyphenyl, p-hydroxyphenyl, p-carboxyphenyl) or a heterocyclic group (e.g., 2-pyridyl, 4-pyridyl, 2-furyl, 1-methyl-4-pyrazolyl, 2-thienyl). R_{11}, R_{12} and R_{13} may be divalent groups which are connected to each other to form a cyclic structure. Specific examples of the group represented by general formula (T-1) include:

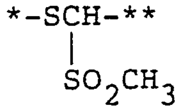
$*\text{-OCH}_2\text{-}**$



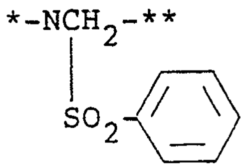


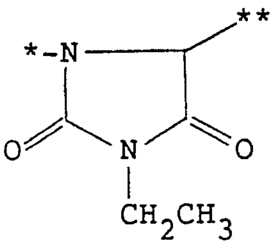
$*\text{-SCH}_2\text{-}**$

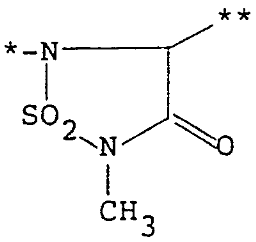




$*\text{-}\underset{\substack{|\\ \text{SO}_2\text{CH}_3}}{\text{SCH}}\text{-}**$



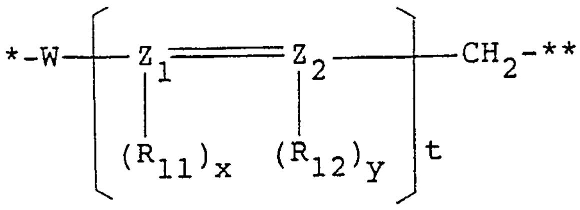




Preferably, either or both of R_{11} and R_{12} are hydrogen atoms.

In general formula (I), the group represented by L_2 is a group which undergoes electron migration along a conjugated system to cause a cleavage reaction.

Examples of such a group include those described in U.S. Patents 4,409,323 and 4,421,845, and JP-A-57-188035, JP-A-58-98728, JP-A-58-209736, JP-A-58-209737 and JP-A-58-209738, and groups represented by general formula (T-2):

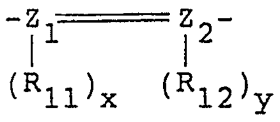


$$*\text{-}W\left[\underset{(R_{11})_x}{Z_1}=\underset{(R_{12})_y}{Z_2}\right]_t CH_2\text{-}**$$

(T-2)

wherein W, R_{11} and R_{12} are as defined in general formula (T-1); * represents the position which is bonded to L_1 in general formula (I); and ** represents the position which is bonded to $INH(CH_2)_nQ$. R_{11} and R_{12} may be connected to each other to form a benzene ring or heterocyclic ring. Alternatively, R_{11} or R_{12} may be connected to W to form a heterocyclic ring.

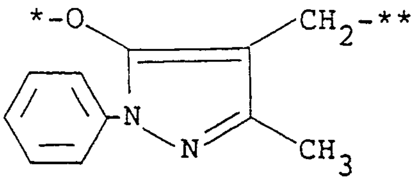
Z_1 and Z_2 each independently represents a carbon atom or a nitrogen atom. The suffixes x and y each independently represents an integer of 0 or 1. When Z_1 is a carbon atom, x represents an integer of 1. When Z_1 is a nitrogen atom, x represents an integer of 0. The relationship between Z_2 and y is the same as that between Z_1 and x. The suffix t represents an integer of 1 or 2. When t is 2, the two

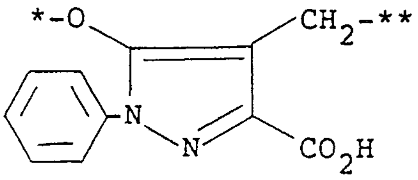


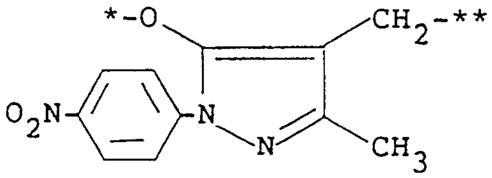
$$-\underset{(R_{11})_x}{Z_1}=\underset{(R_{12})_y}{Z_2}-$$

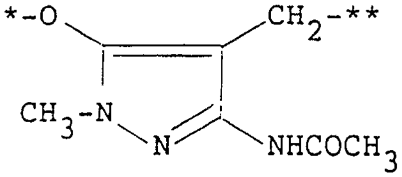
groups may be the same or different.

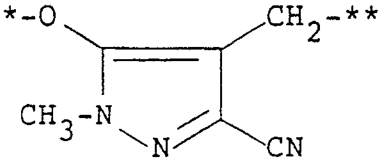
Preferred examples of the group represented by general formula (T-2) are set forth below.

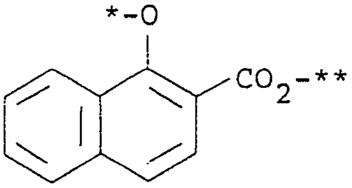


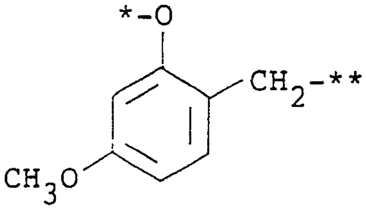


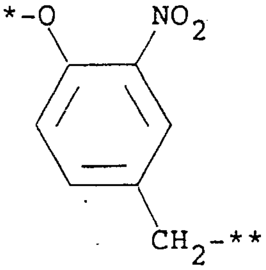


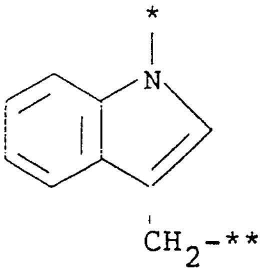


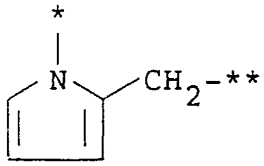


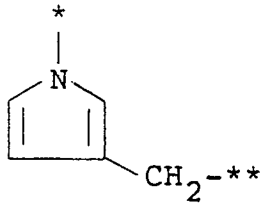


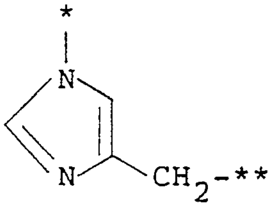


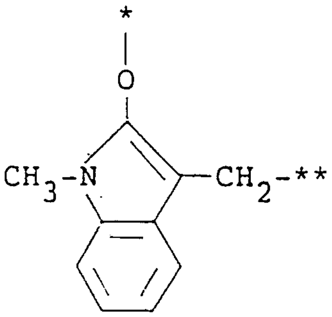


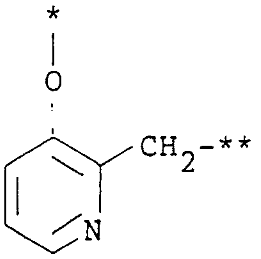

*
N
CH2-**


*
N
CH2-**

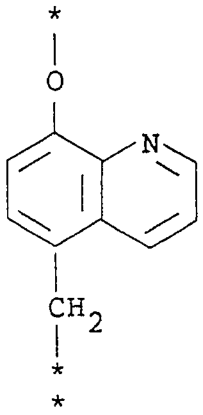

*
N
CH2-**


*
N
N
CH2-**

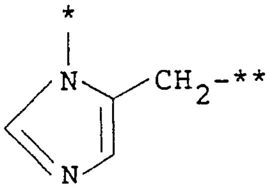

*
O
CH3-N
CH2-**



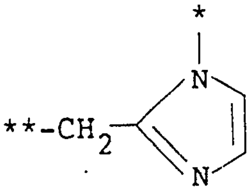
*
O
CH2-**
N



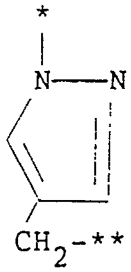
*
O
N
CH2
*
*

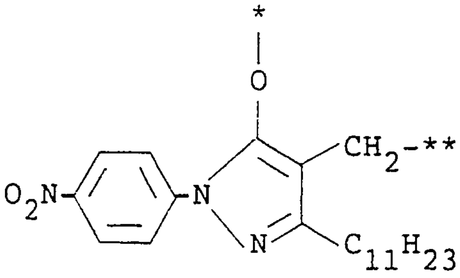


*
N
CH2-**
N



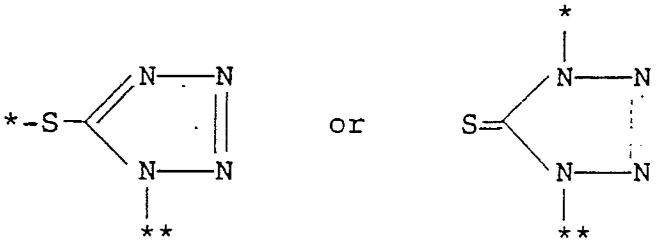
*
N
**-CH2
N



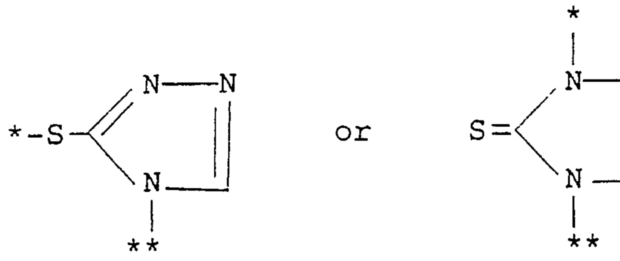


Preferred among these groups are those which are connected to L_1 via a nitrogen atom.

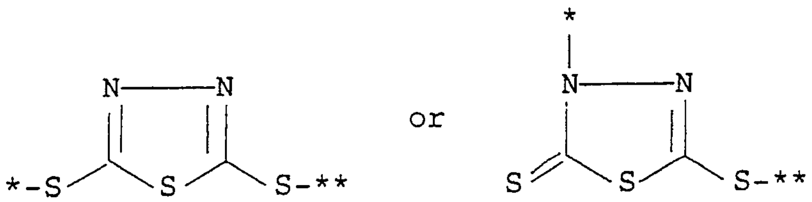
In the compound represented by general formula (I), the group represented by INH is a development inhibitor residue which is connected to L_2 via a hetero atom. INH is preferably a group represented by any one of general formulae (INH-1) to (INH-12).



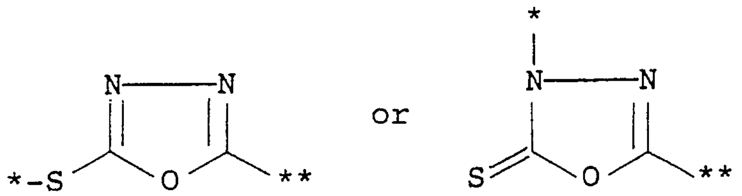
(INH-1)



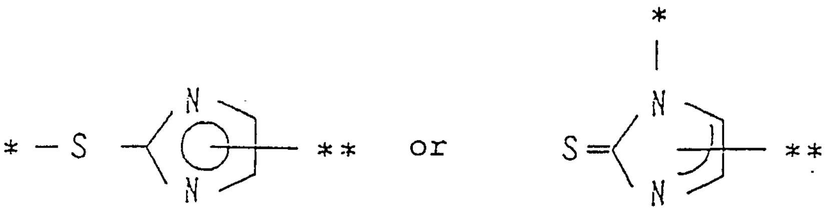
(INH-2)



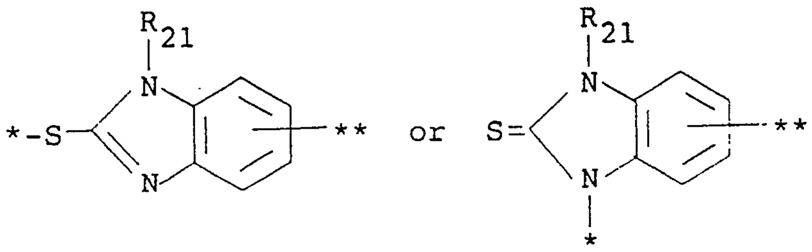
(INH-3)



(INH-4)

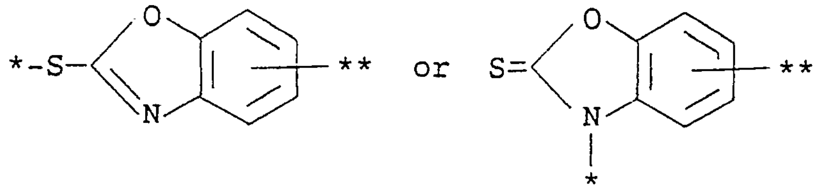


(INH-5)

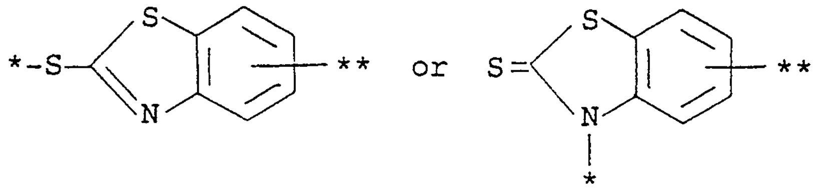


(INH-6)

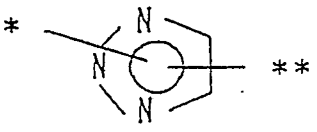
wherein R_{21} represents a hydrogen atom or a substituted or unsubstituted hydrocarbon group (e.g., methyl, ethyl, propyl, phenyl).



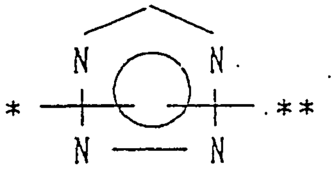
(INH-7)



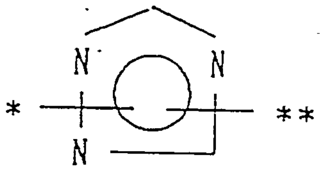
(INH-8)



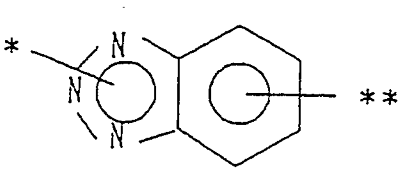
(INH-9)



(INH-10)



(INH-11)



(INH-12)

wherein * represents the position which is bonded to L_2 in the compound represented by general formula (I); and ** represents the position which is connected to $-(CH_2)_n-Q$ in the compound represented by general formula (I).

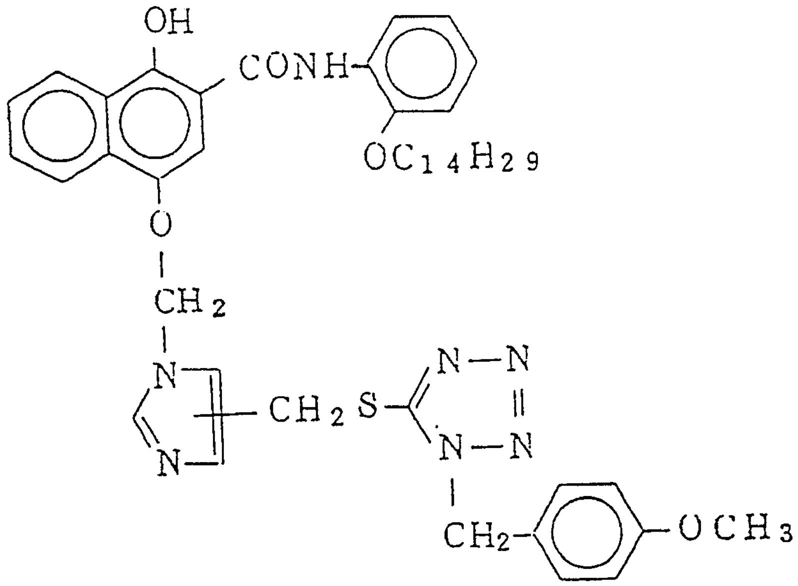
Preferred among these groups are (INH-1), (INH-2), (INH-3), (INH-4), and (INH-12). Particularly preferred among these groups are (INH-1) and (INH-3).

In the compound represented by general formula (I), Q is a group having a molecular weight of 80 to 250, preferably 90 to 200, more preferably 100 to 150. In particular, if n in the compound represented by general formula (I) is 0, Q represents a substituted or unsubstituted 2-branched alkyl group (e.g., 2-hexyl, 2-octyl, t-octyl, 2-decyl, 2-dodecyl) or an electron donating group-containing aryl group (e.g., p-methoxyphenyl, p-tolyl). If n is 1 or more, Q represents an alkyl group (e.g., hexyl, octyl, t-octyl, decyl, dodecyl), an acylamino group (e.g., benzamide, hexanamide), an alkoxy group (e.g., octyloxybenzyloxy), a sulfonamide group (e.g., pentanesulfonamide, p-toluenesulfonamide), an aryl group (e.g., p-methoxyphenyl, p-dimethylaminophenyl, p-ethyl-phenyl), an alkylthio group (e.g., hexylthio, octylthio), an alkylamino group (e.g., dibutylamino, piperidino), an alkoxycarbonyl group (e.g., butoxycarbonyl, hexyloxycarbonyl), an acyloxy group (e.g., butanoyloxy, benzoyloxy), a sulfonyl group (e.g., butanesulfonyl, benzenesulfonyl), an aryloxy group (e.g., phenoxy, p-tolyloxy, p-methoxyphenoxy), a carbamoyl group (e.g., dipropylcarbamoyl, phenylmethylcarbamoyl), a sulfamoyl group (e.g., dimethylsulfamoyl, diethylsulfamoyl), a nitro group, a cyano group, or an aryloxycarbonyl group (e.g., phenoxycarbonyl, 4-methoxyphenoxycarbonyl). Q may be further substituted by substitutable groups.

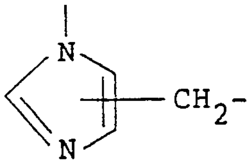
The suffix n is preferably an integer of 0 to 2, particularly 0 or 1. When n is 0, Q is preferably an electron donating group-containing aryl group. When n is 1 or more, Q is preferably an alkoxy group, an aryl group, or an aryloxy group. In a particularly preferred case, n is 1 and Q is an aryl group.

Specific examples of the compound represented by general formula (I) of the present invention are set forth below by Compounds (1) to (45), but the present invention should not be construed as being limited thereto.

(1)

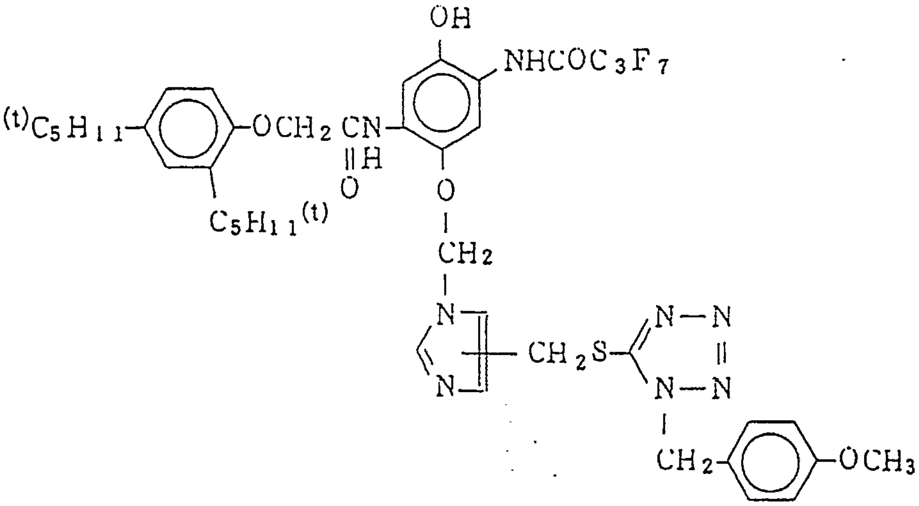


The group

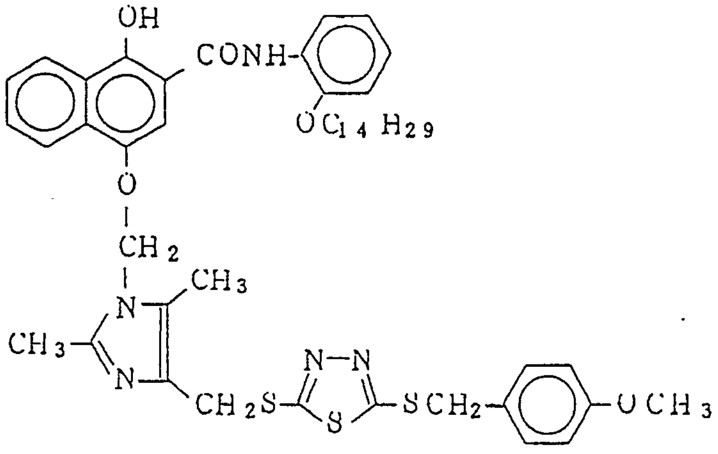


in Compound (1) and the following compounds indicates that the imidazole is connected to -CH_2- in its 4- or 5-position.

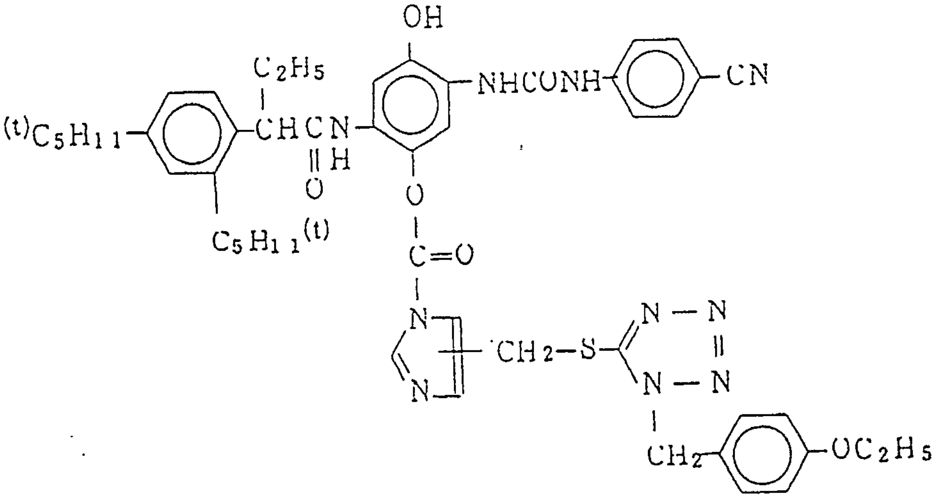
(2)



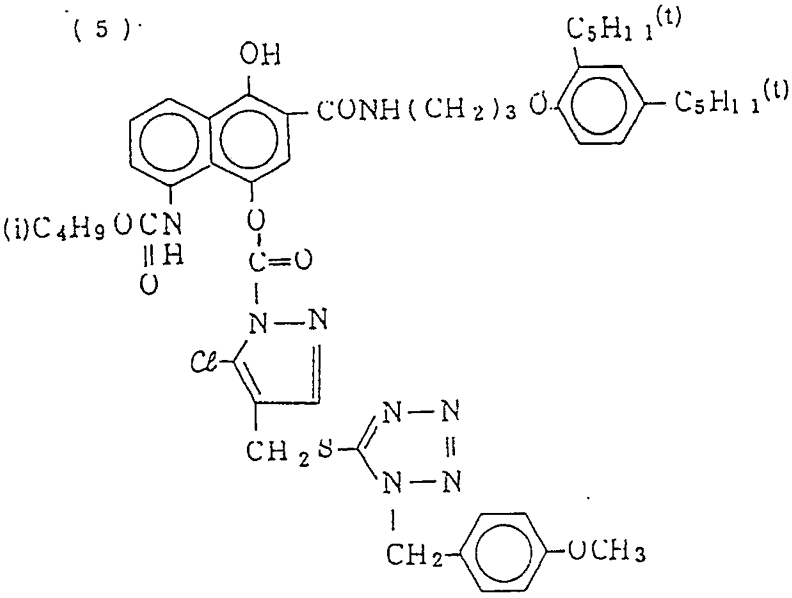
(3)



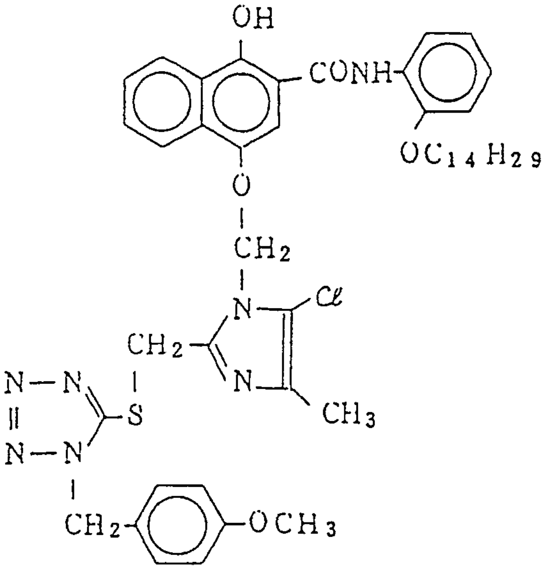
(4)



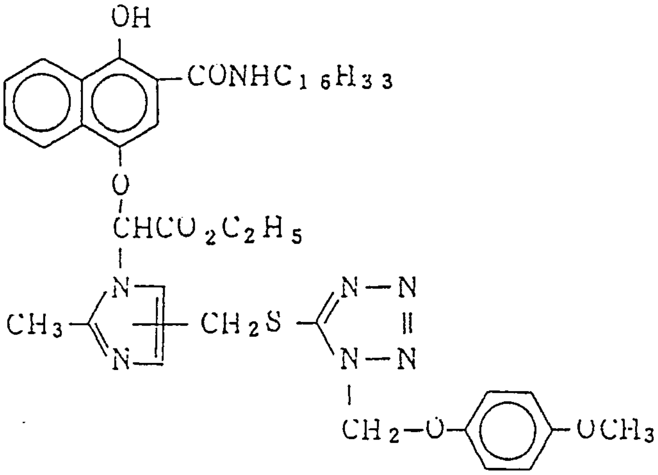
(5)



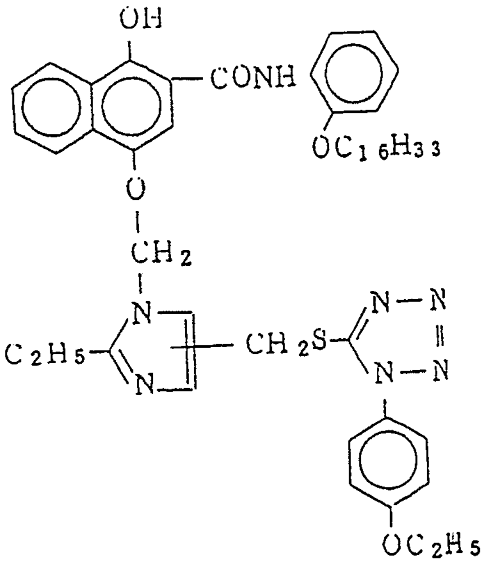
(6)



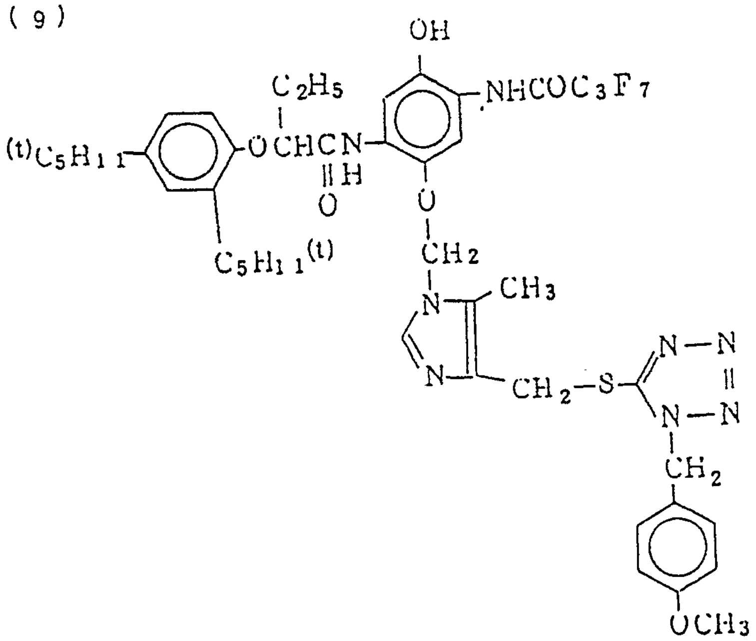
(7)



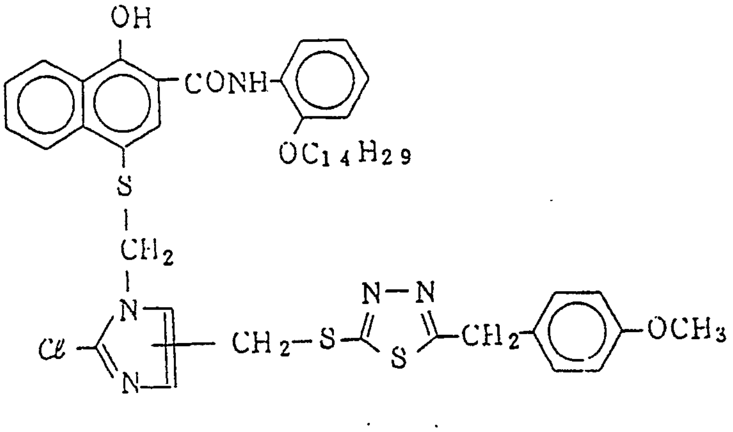
(8)



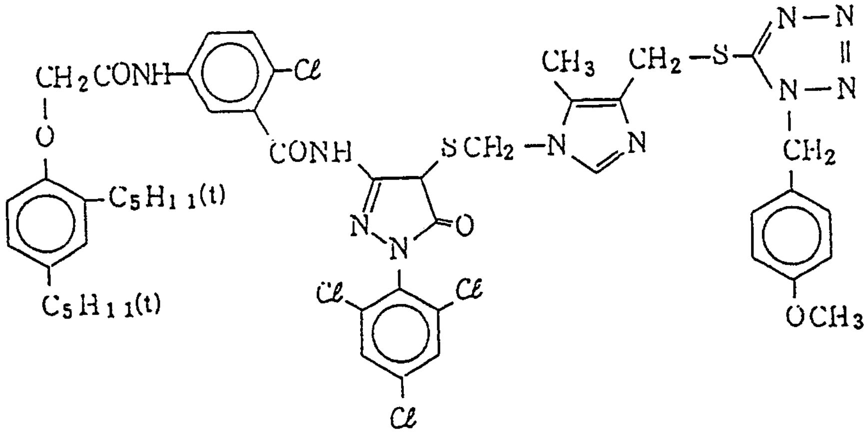
(9)



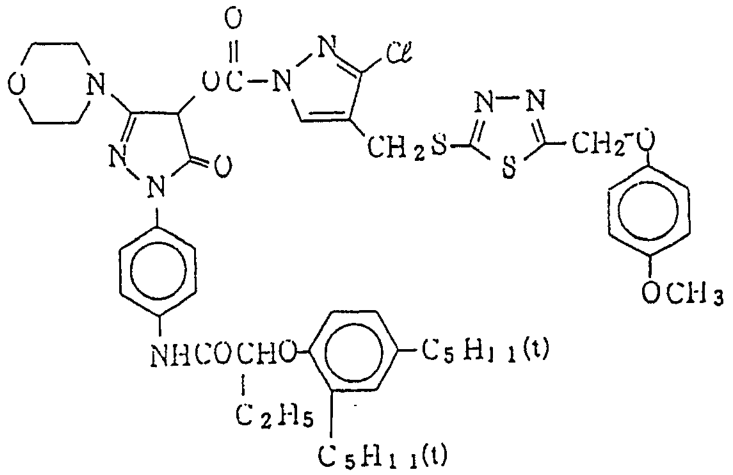
(10)


OH
CONH
$OC_{14}H_{29}$
S
CH_2
N
Cl
N
CH_2-S
N−N
S
CH_2
OCH_3

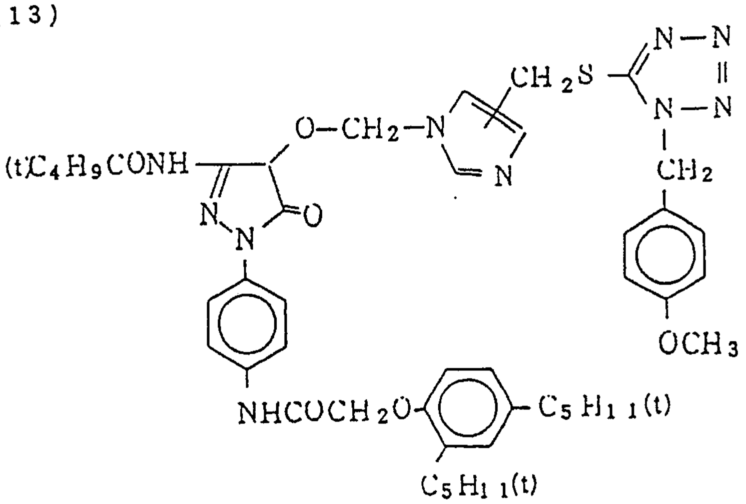
(11)


CH_2CONH
Cl
O
$C_5H_{11}(t)$
$C_5H_{11}(t)$
CONH
N
N
O
Cl
Cl
Cl
SCH_2
N
N
CH_3
CH_2-S
N−N
N−N
CH_2
OCH_3

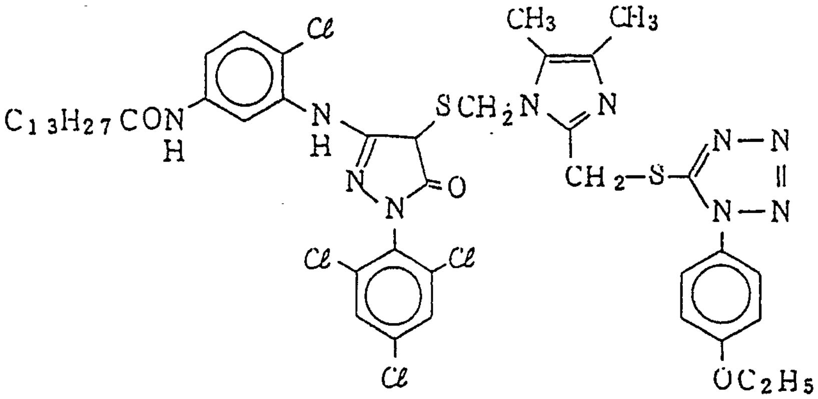
(12)



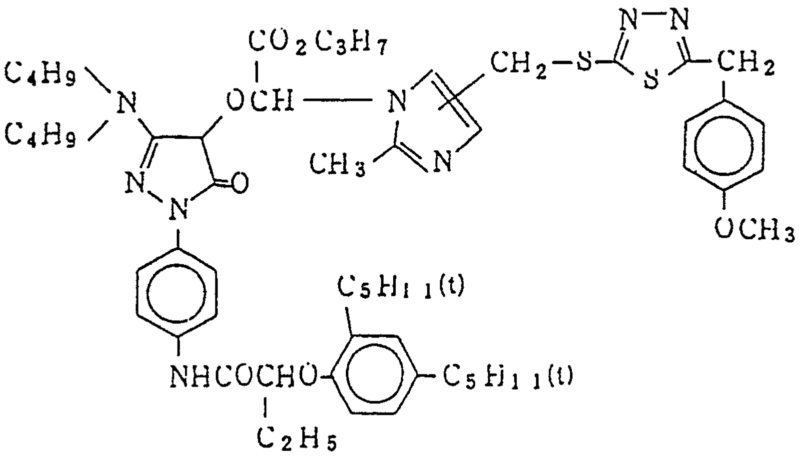
(13)



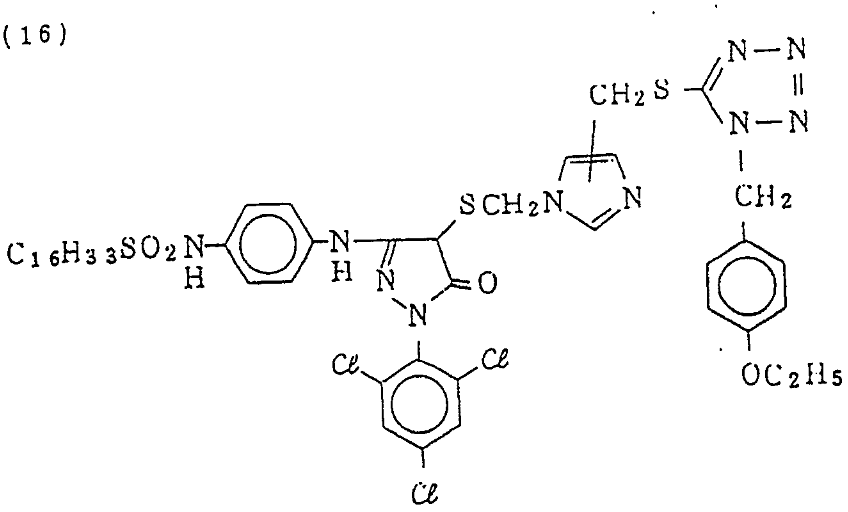
(14)


Cl
CH3
CH3
C13H27CON
H
N
H
SCH2N
N
N—N
N
O
CH2—S
N—N
Cl
Cl
Cl
OC2H5

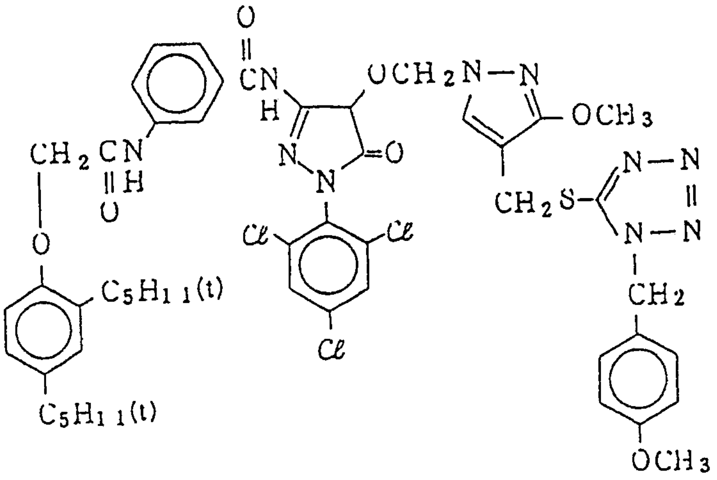
(15)


CO2C3H7
C4H9
N
C4H9
OCH
N
CH2—S
N—N
S
CH2
CH3
N
N
N
O
OCH3
C5H11(t)
NHCOCHO
C5H11(t)
C2H5

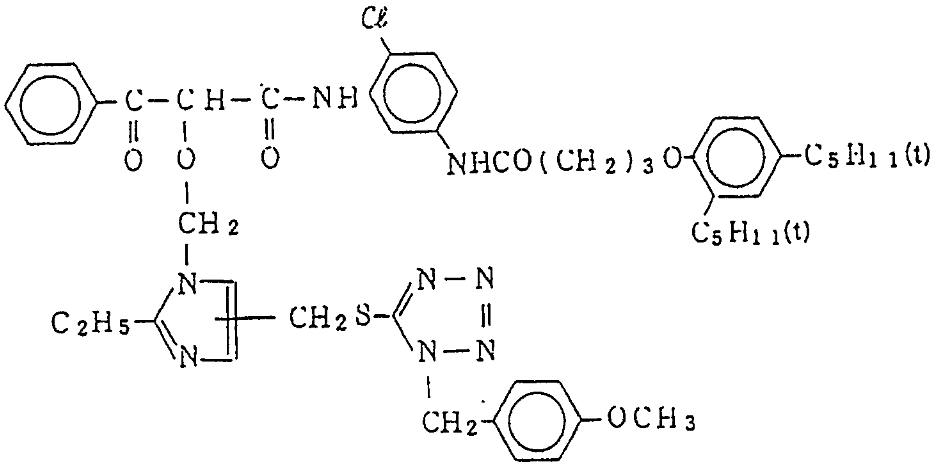
(16)



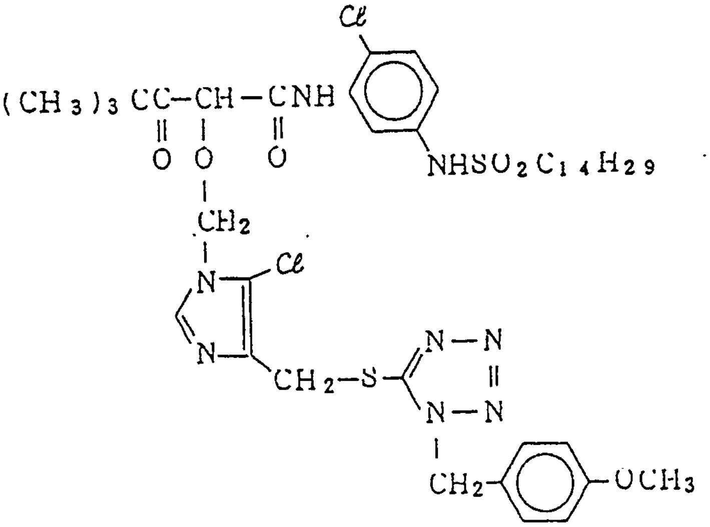
(17)



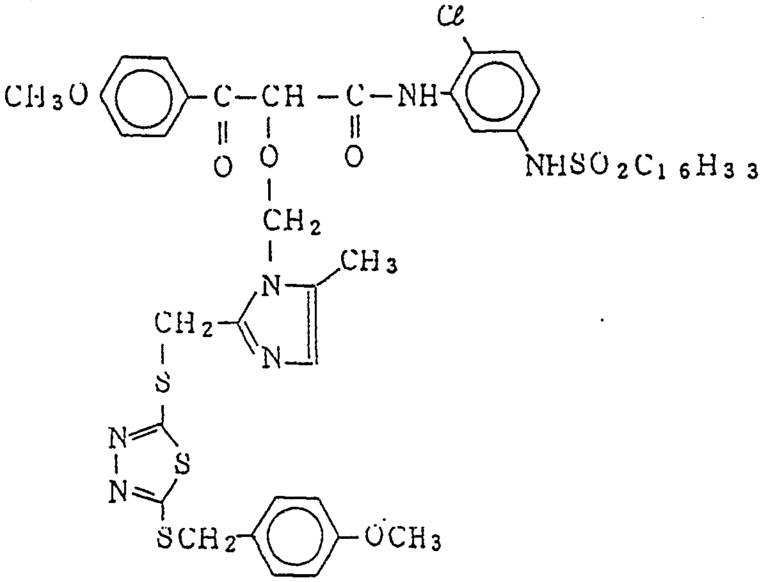
(18)


Cl
C-CH-C-NH
O O O
NHCO(CH2)3O
C5H11(t)
C5H11(t)
CH2
N
C2H5
N
CH2S
N—N
N—N
CH2
OCH3

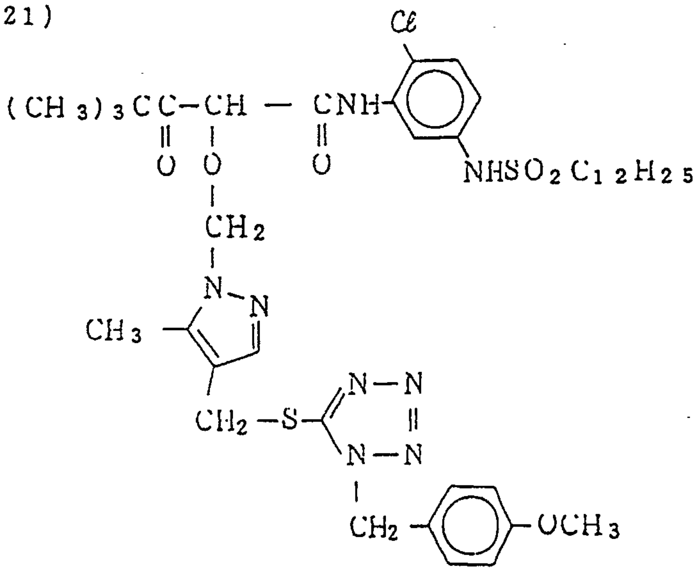
(19)


Cl
(CH3)3CC-CH-CNH
O O O
NHSO2C14H29
CH2
N
Cl
N
CH2-S
N—N
N—N
CH2
OCH3

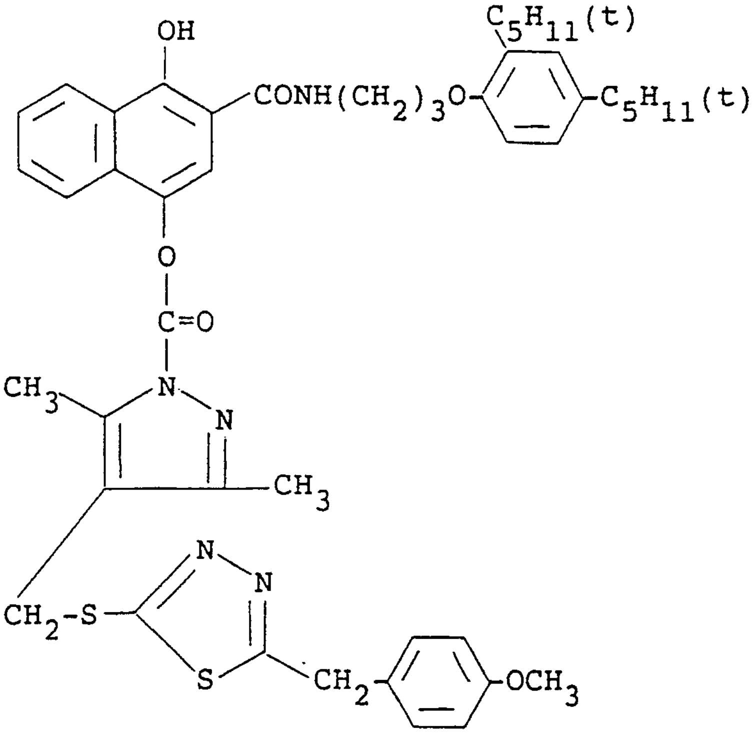
(20)



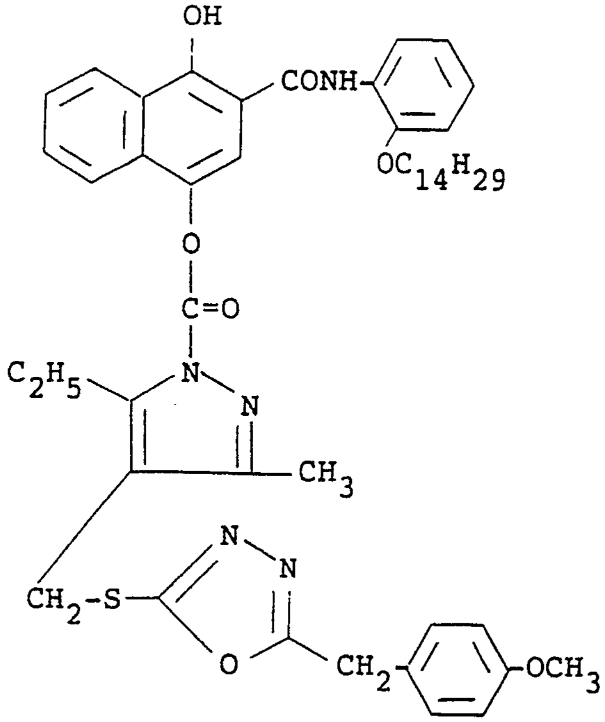
(21)



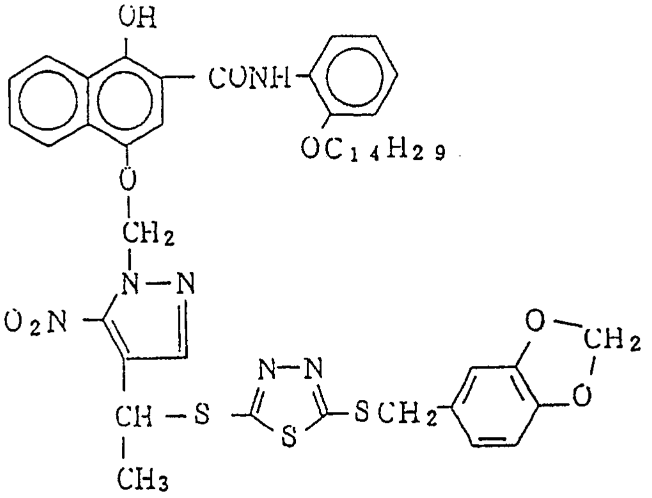
(22)


OH
CONH(CH2)3O
C5H11(t)
C5H11(t)
O
C=O
N
N
CH3
CH3
N
N
CH2-S
S
CH2
OCH3

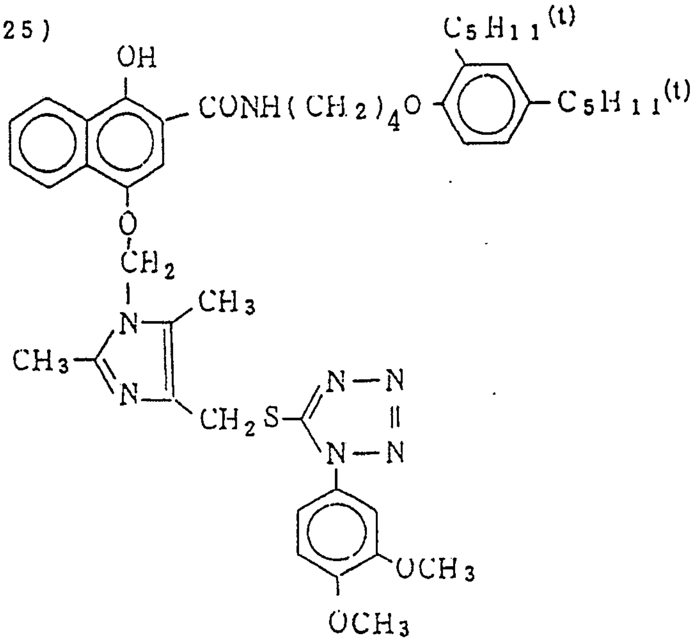
(23)


OH
CONH
OC14H29
O
C=O
C2H5
N
N
CH3
N
N
CH2-S
O
CH2
OCH3

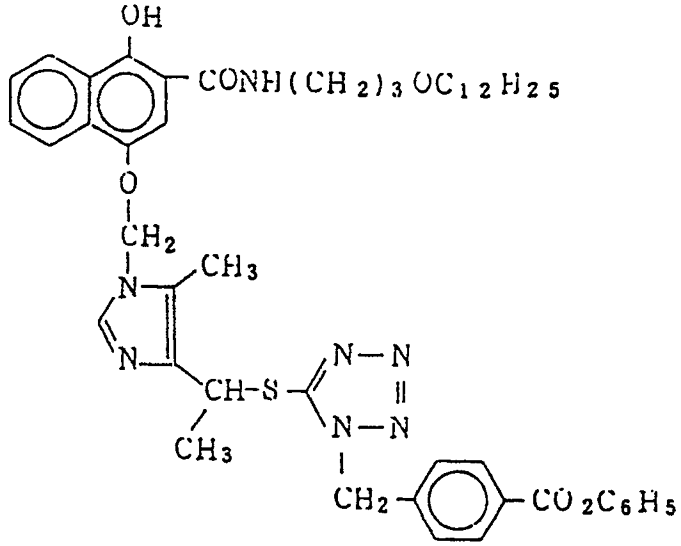
(24)



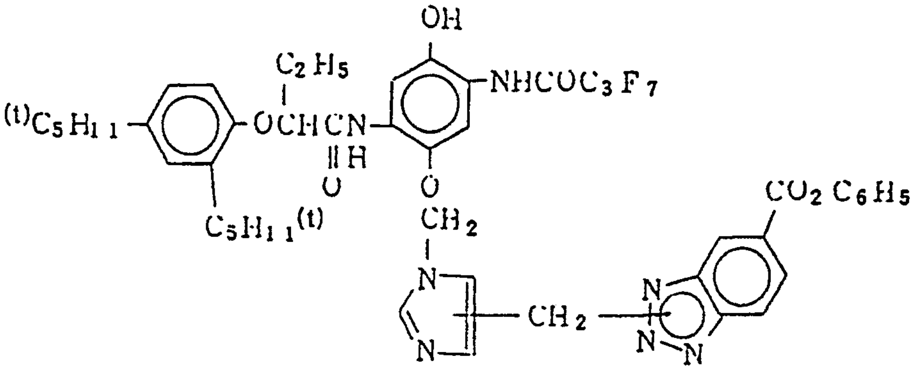
(25)



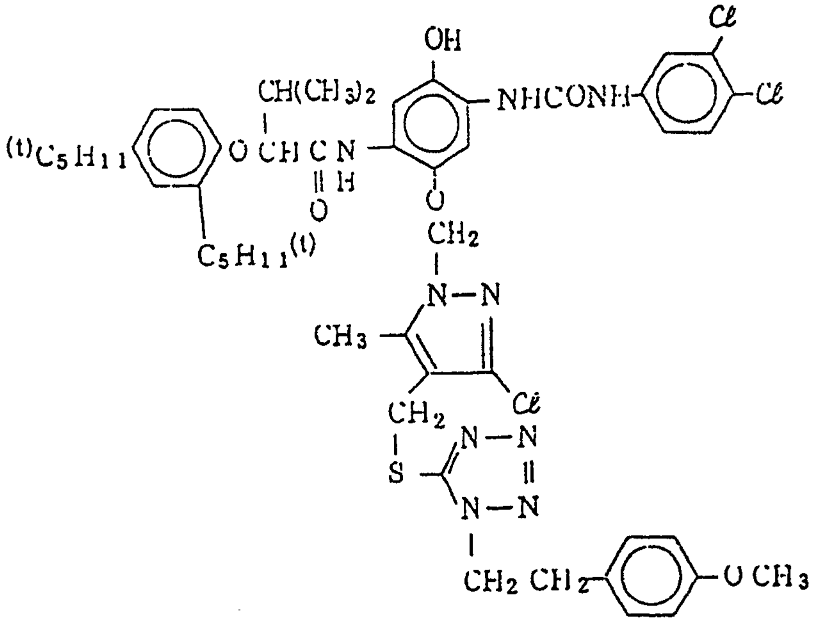
(26)


OH
CONH(CH2)3OC12H25
O
CH2
N
CH3
N
CH-S
N—N
N—N
CH3
CH2
CO2C6H5

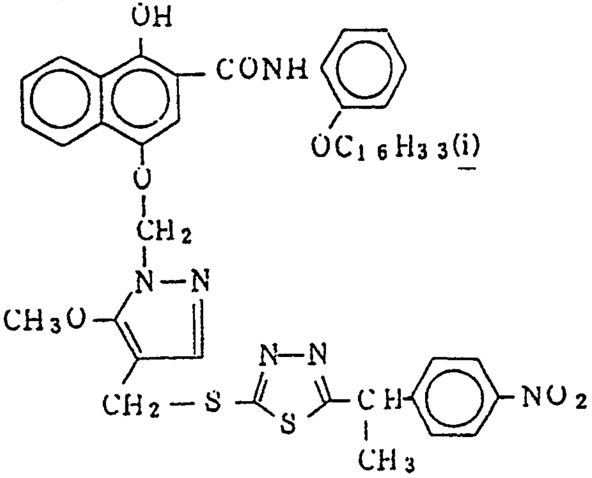
(27)


OH
C2H5
NHCOC3F7
(t)C5H11
OCHCN
H
O
O
C5H11(t)
CH2
CO2C6H5
N
N
CH2
N
N
N

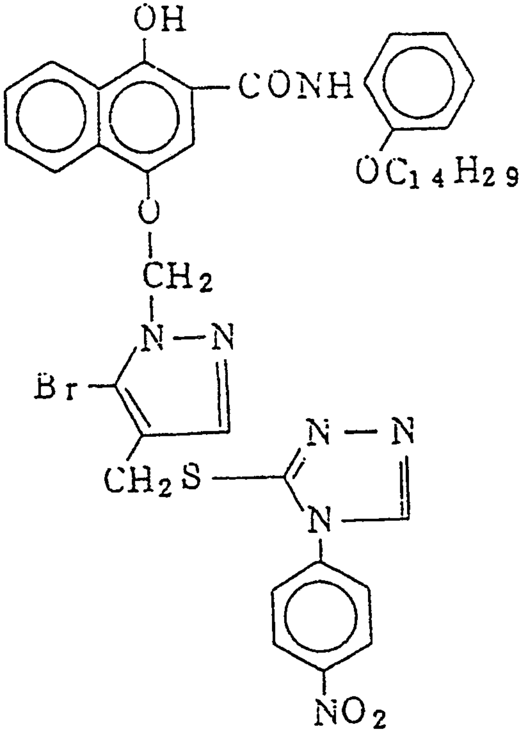
(28)


OH
NHCONH
Cℓ
Cℓ
CH(CH3)2
(t)C5H11
O CH C N
H
O
C5H11(t)
O
CH2
N—N
CH3
Cℓ
CH2
S
N—N
N—N
CH2 CH2
OCH3

(29)

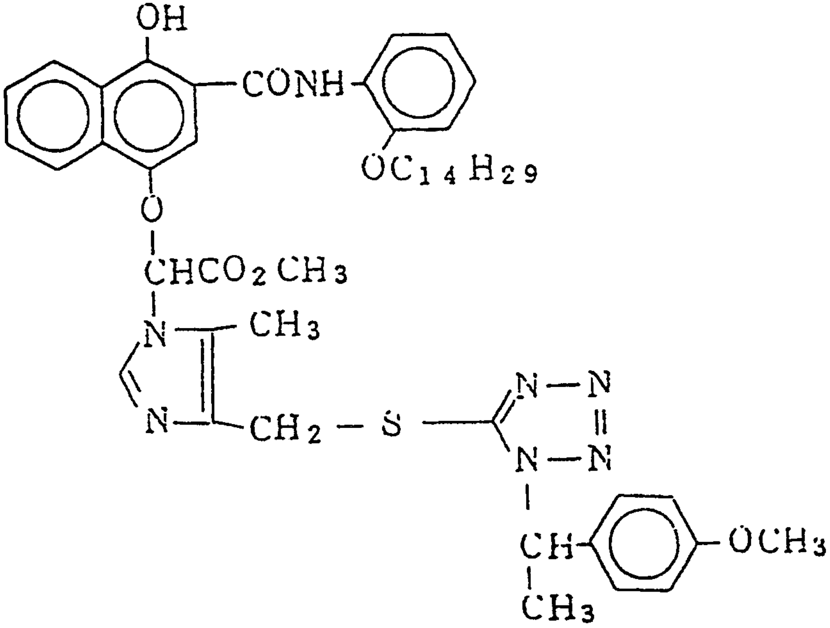

OH
CONH
OC16H33(i)
O
CH2
N—N
CH3O
N—N
CH2—S
S
CH
CH3
NO2

(30)



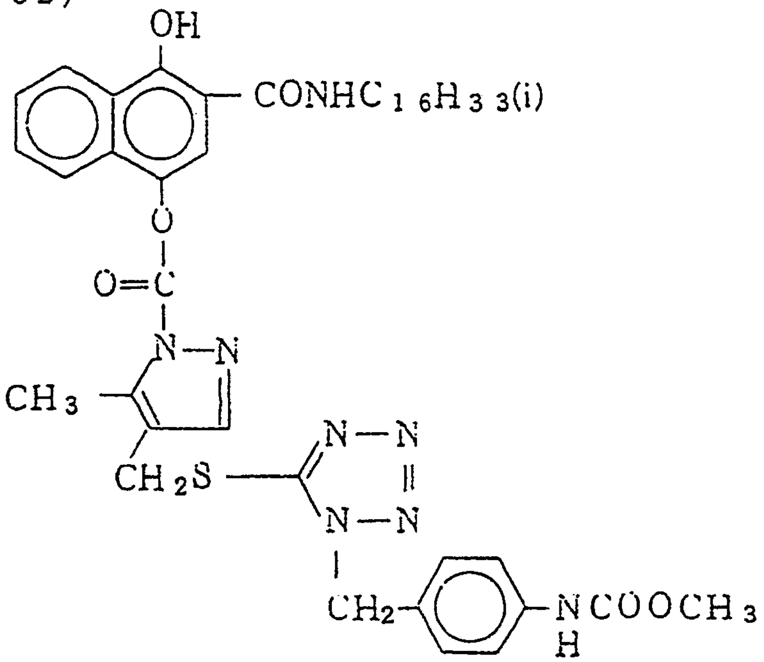
OH
CONH
OC14H29
O
CH2
N
N
Br
N
N
CH2S
N
NO2

(31)

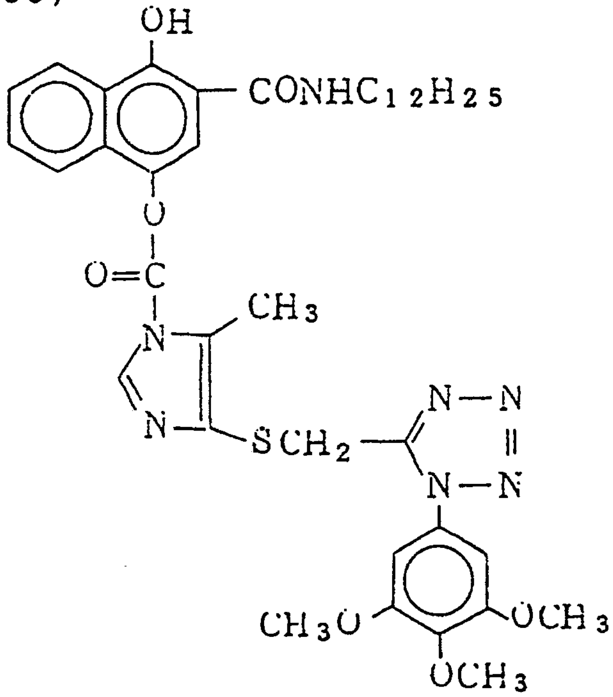


OH
CONH
OC14H29
O
CHCO2CH3
N
CH3
N
CH2
S
N
N
N
N
CH
OCH3
CH3

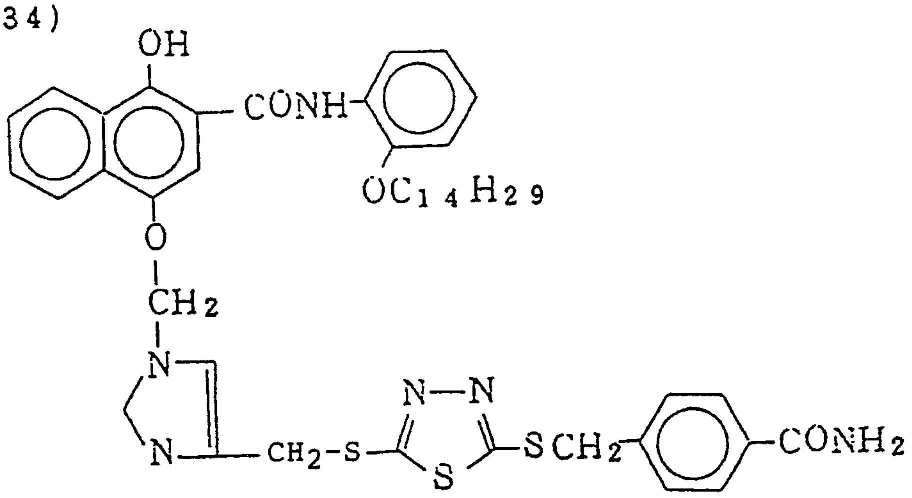
(32)


OH
CONHC16H33(i)
O
O=C
N-N
CH3
CH2S
N-N
N-N
CH2
NCOOCH3
H

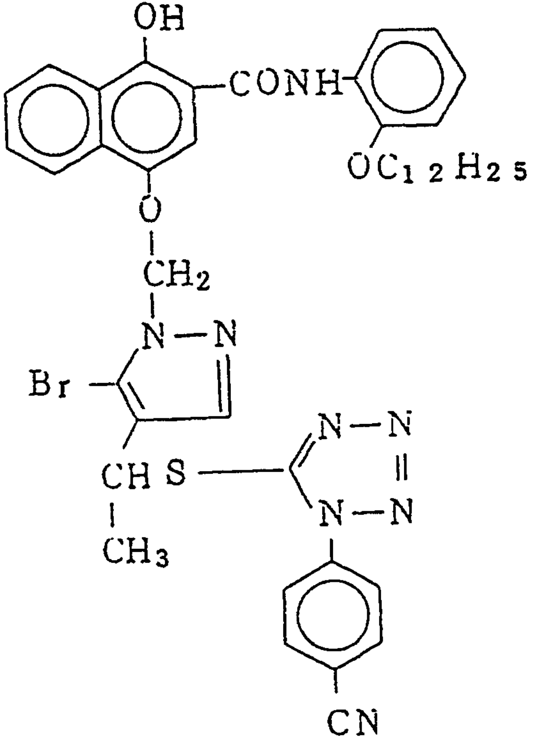
(33)


OH
CONHC12H25
O
O=C
CH3
N
N
SCH2
N-N
N-N
CH3O
OCH3
OCH3

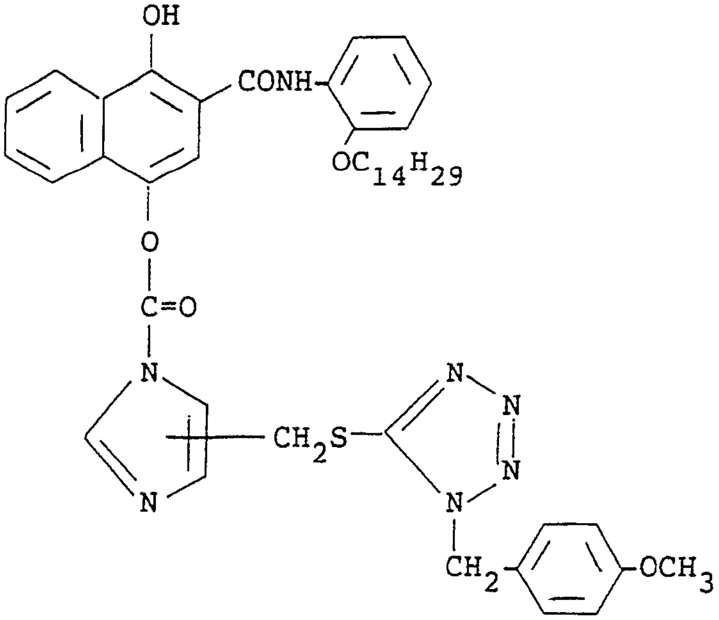
(34)


OH
CONH
$OC_{14}H_{29}$
O
CH_2
N
N
CH_2-S
N—N
S
SCH_2
$CONH_2$

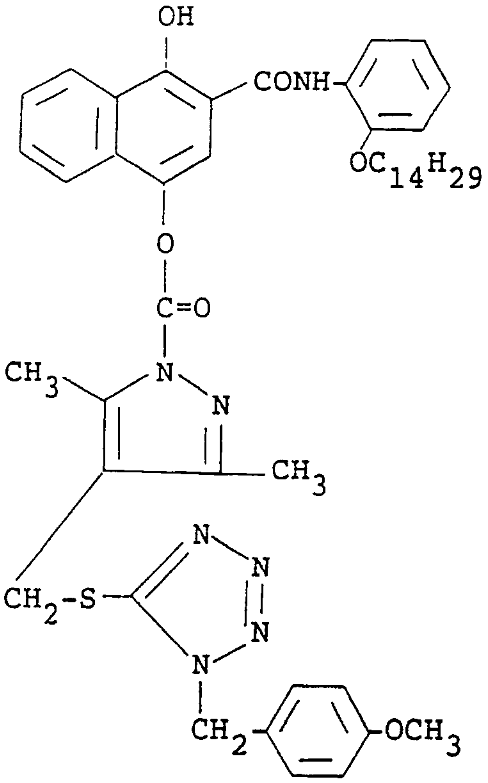
(35)


OH
CONH
$OC_{12}H_{25}$
O
CH_2
N—N
Br
CH S
CH_3
N—N
N—N
CN

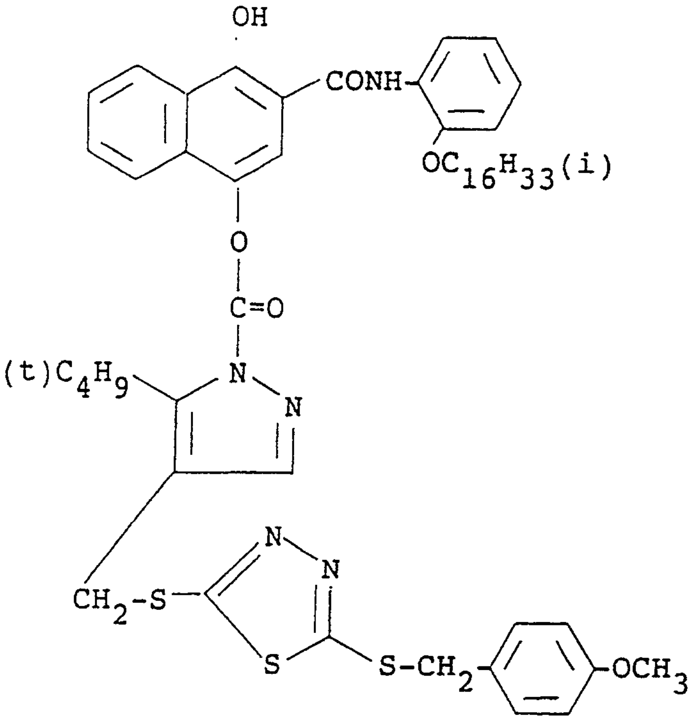
(36)


OH
CONH
$OC_{14}H_{29}$
O
C=O
N
N
CH_2S
N
N
N
N
CH_2
OCH_3

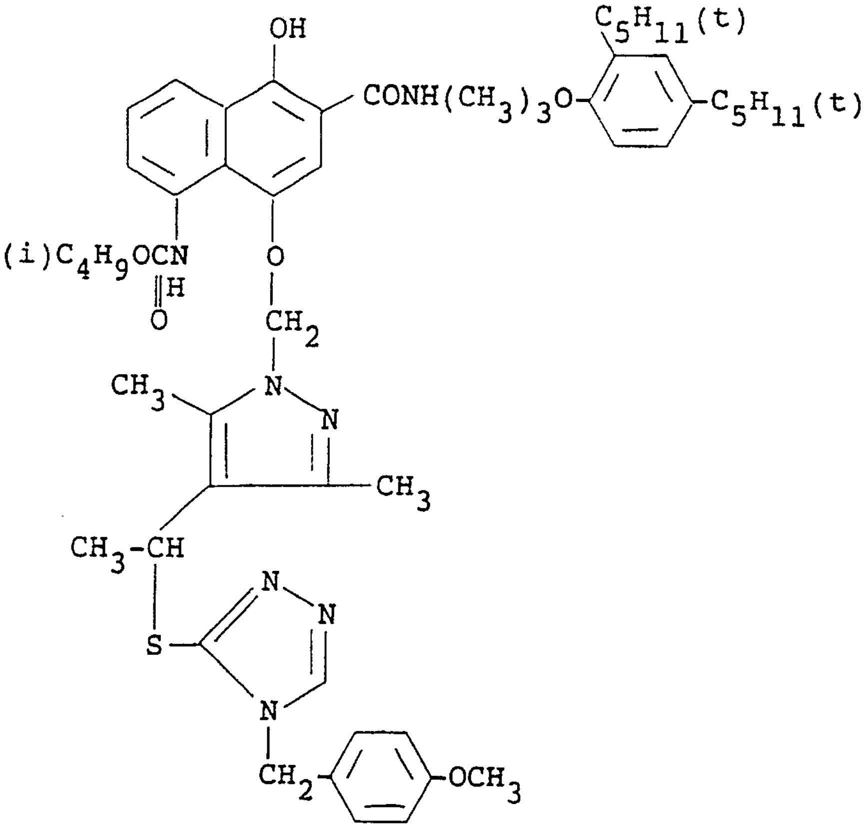
(37)


OH
CONH
$OC_{14}H_{29}$
O
C=O
CH_3
N
N
CH_3
N
N
N
CH_2-S
N
CH_2
OCH_3

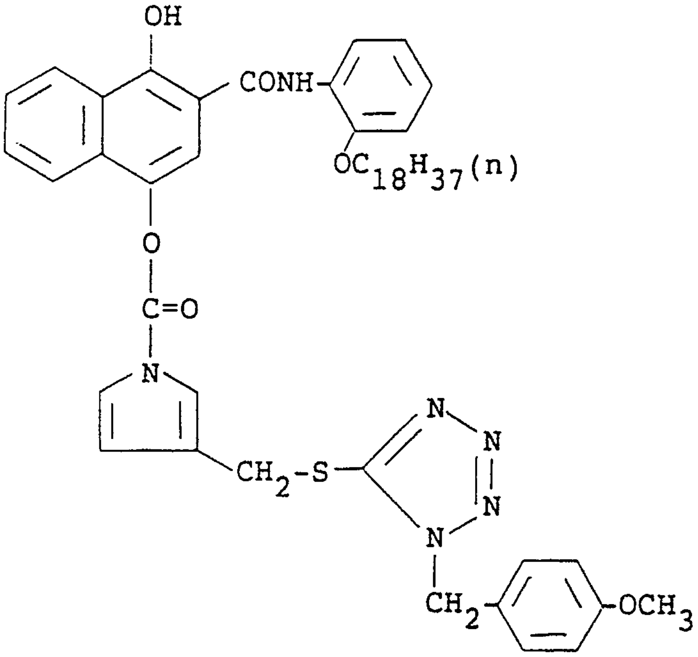
(38)



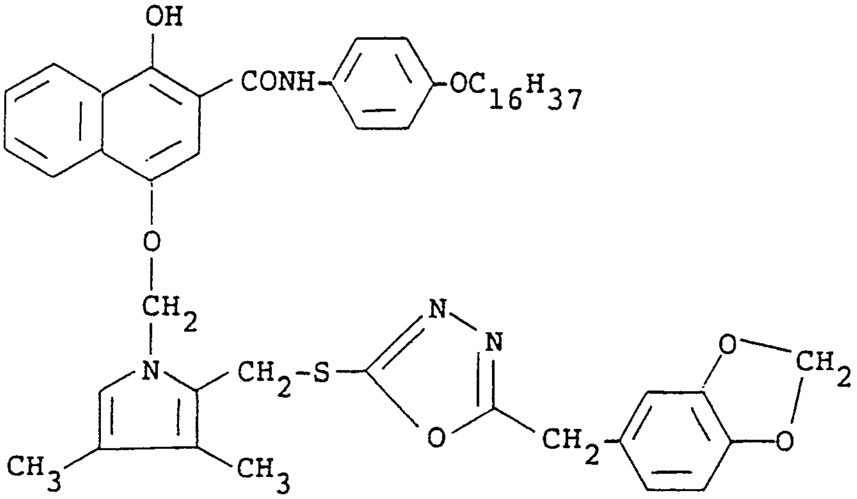
(39)


OH
CONH(CH3)3O
C5H11(t)
C5H11(t)
(i)C4H9OCN
H
O
O
CH2
N
N
CH3
CH3
CH3-CH
S
N
N
N
CH2
OCH3

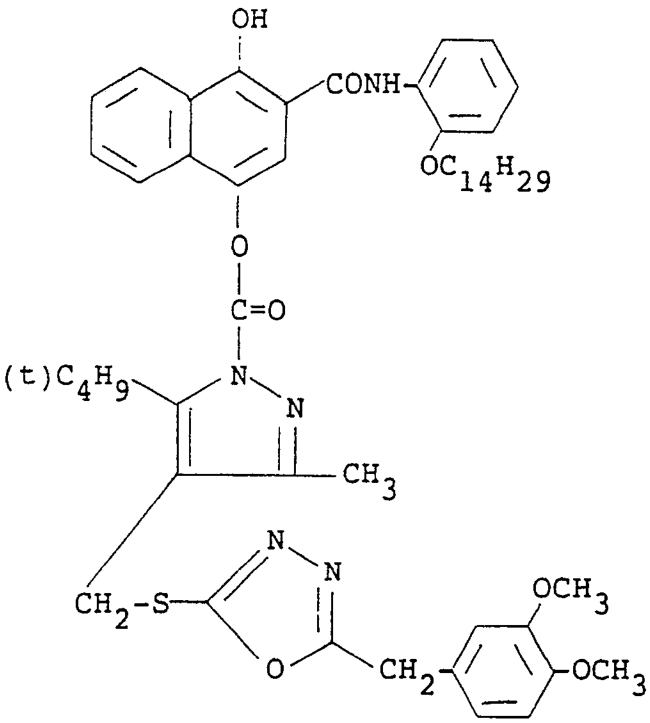
(40)


OH
CONH
$OC_{18}H_{37}(n)$
O
C=O
N
CH_2-S
N
N
N
N
CH_2
OCH_3

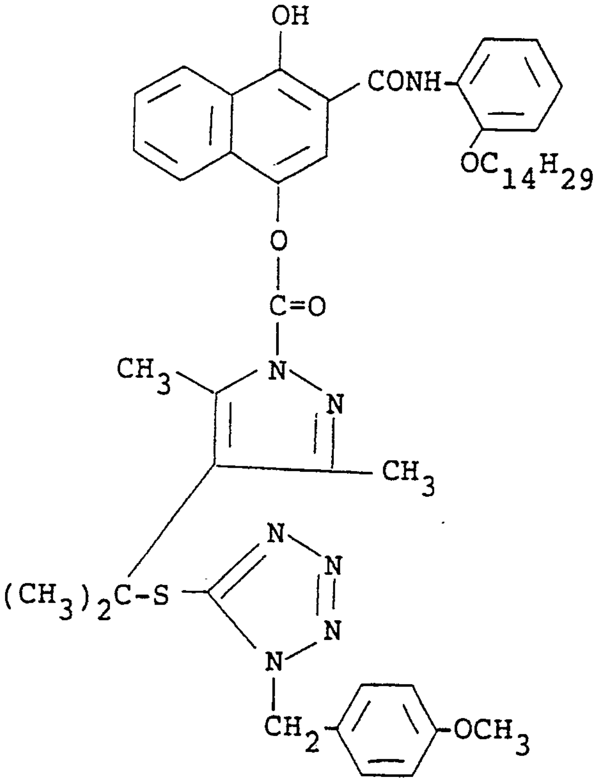
(41)


OH
CONH
$OC_{16}H_{37}$
O
CH_2
N
CH_2-S
N
N
O
CH_2
O
CH_2
O
CH_3
CH_3

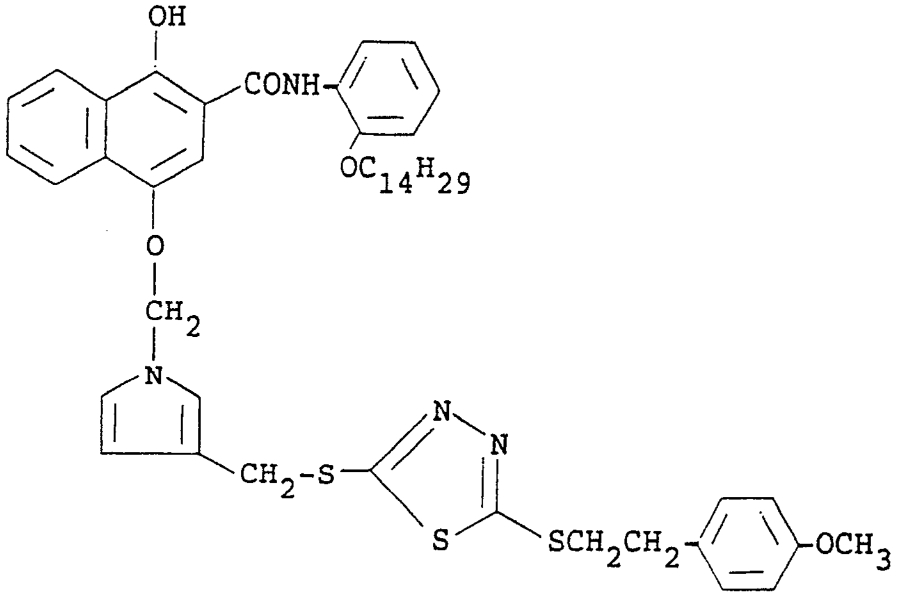
(42)



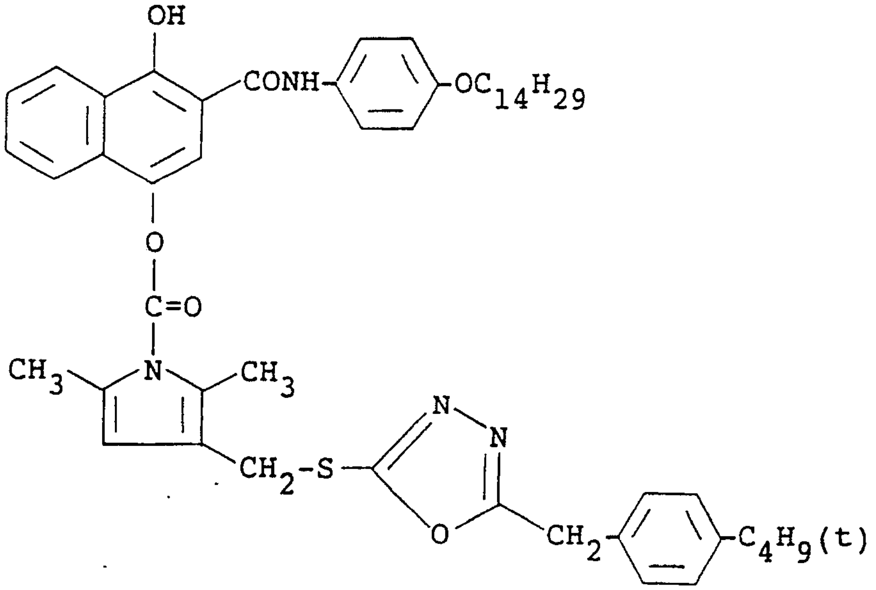
(43)



(44)

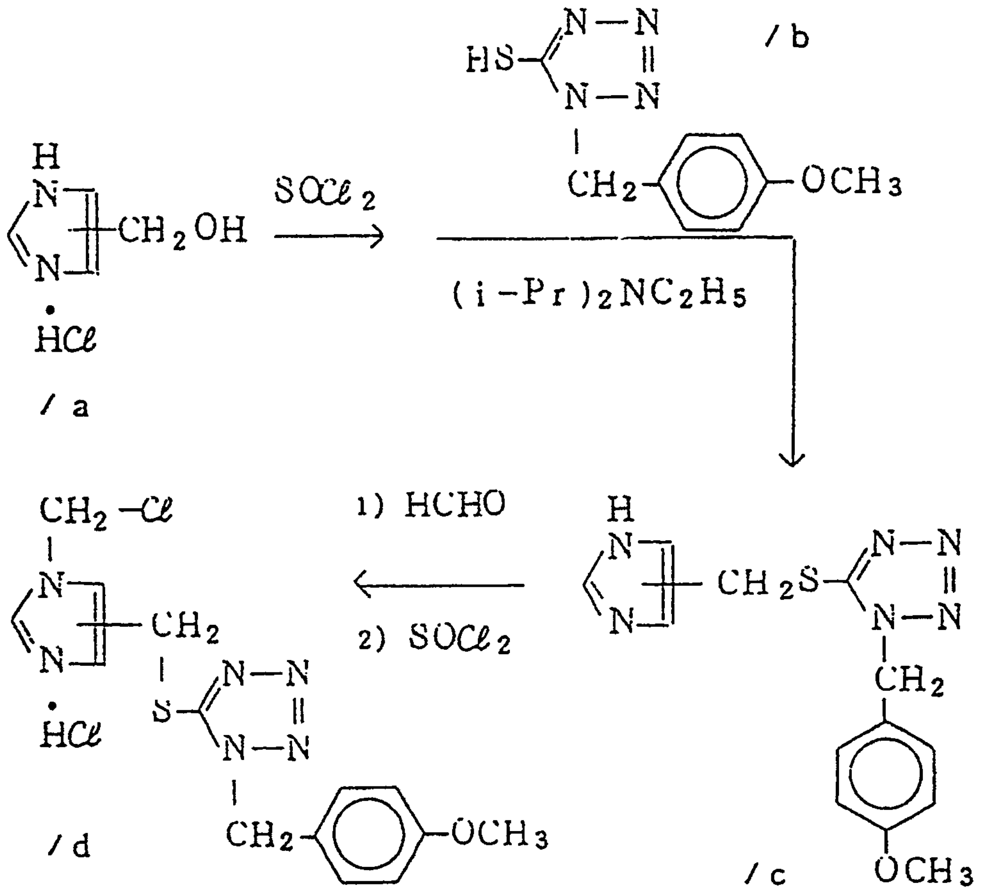


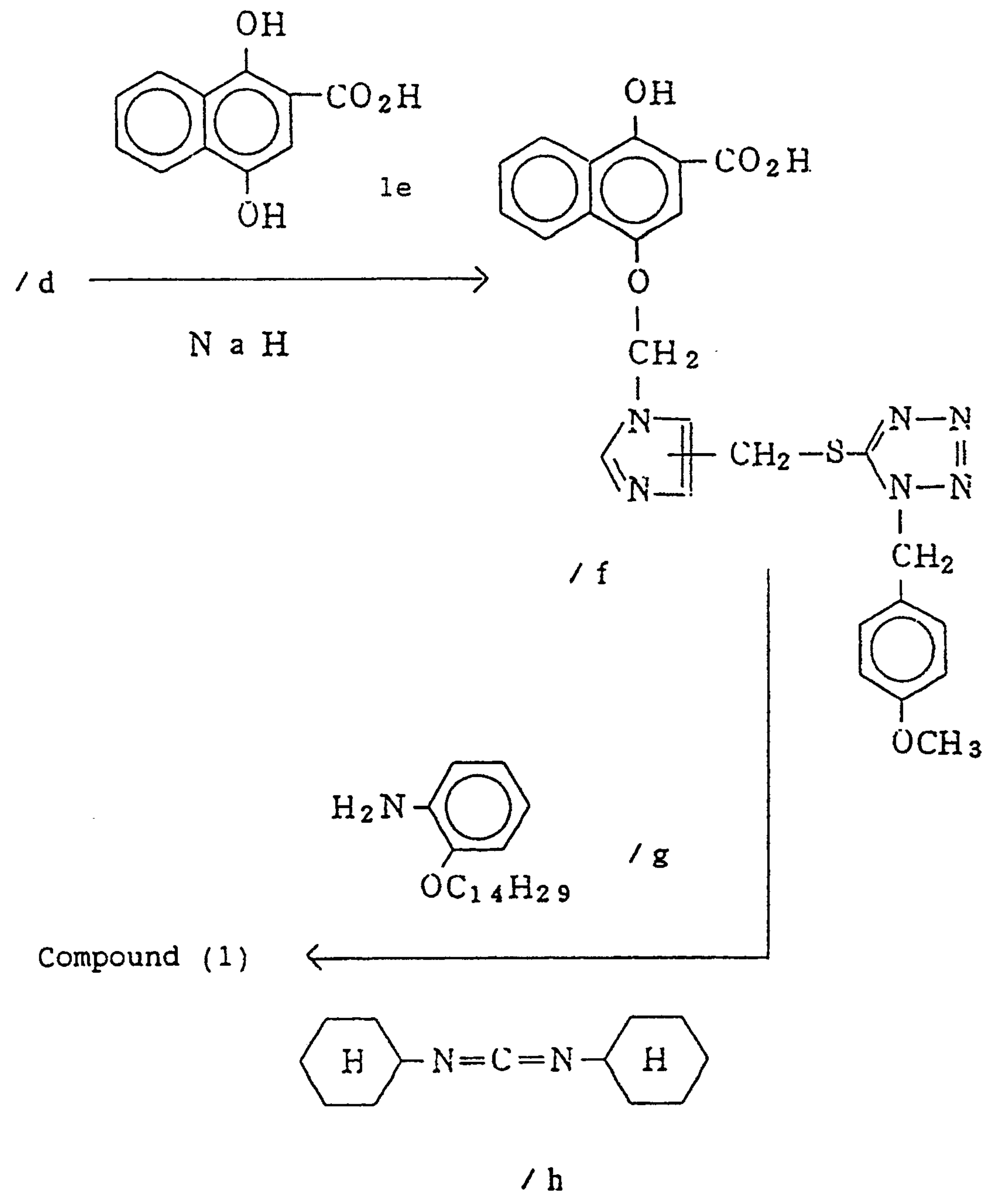
(45)



The compound of the present invention can be synthesized in accordance with the method disclosed in JP-A-60-218645. Specific examples of the syntheses of Compound (1) and Compound (37) will be set forth below.

SYNTHESIS EXAMPLE 1


/ b
SOCl2
(i-Pr)2NC2H5
/ a
1) HCHO
2) SOCl2
/ d
/ c



Synthesis of Compound 1c:

13.4 g of Compound 1a (hydrochloride of 4-or 5-hydroxymethylimidazole) was refluxed in 30 ml of thionyl chloride for 1.5 hours. Thionyl chloride was then distilled off under reduced pressure. 40 ml of methylene chloride was added to the material. The solvent was then distilled off under reduced pressure. The resulting coarse crystal was added to a solution of 22.2 g of Compound 1b in 60 ml of DMF and 25.8 g of diisopropyl ethylamine. The mixture was allowed to undergo reaction for 2 hours. Water was then added to the system. The resulting crystal was filtered off to obtain 30 g of Compound 1c.

Synthesis of Compound 1d:

30 g of Compound 1c and 22.5 ml of a 37% aqueous solution of formalin were reacted at a temperature of 80° C in 80 ml of acetic acid for 2 hours. The solvent was then distilled off under reduced pressure. 30 ml of thionyl chloride was added to the system. The reaction system was allowed to undergo reaction under reflux for 2 hours. The excess thionyl chloride was removed under reduced pressure. Ether was added to

the system to obtain 32 g of Compound 1d as coarse crystal.

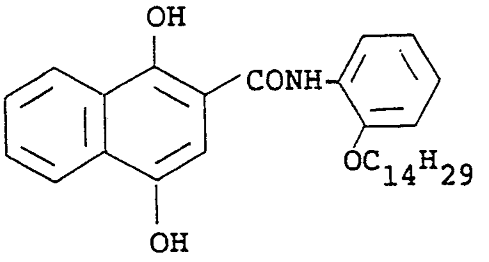
Synthesis of Compound 1f:

6 g of a 60% oil dispersion of sodium hydride was added to a solution of 10.2 g of Compound 1e in 30 ml of DMF. 19 g of Compound 1d was added to the system. The reaction system was then allowed to undergo reaction for 3 hours. 1 N hydrochloric acid was added to the system to acidify the system. The reaction system was then extracted with chloroform. The resulting extract was washed with water, dried with sodium sulfate, and then concentrated to obtain an oily matter. With a 5/1 mixture of chloroform and MeOH as effluent, the oily matter was then purified through a silica gel column chromatography to obtain 5.2 g of Compound 1f.

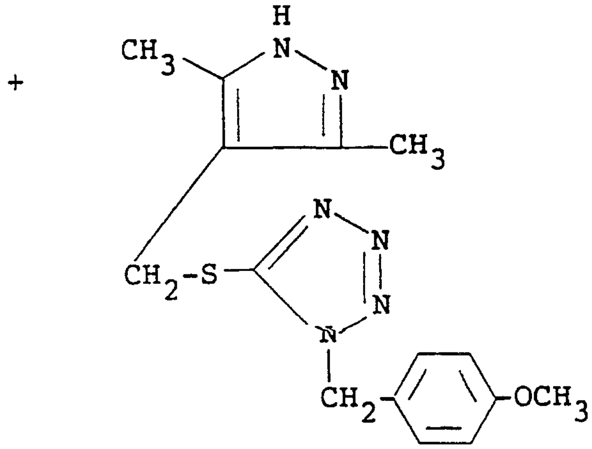
Synthesis of (1):

A solution of 2.1 g of Compound 1h in 6 ml of ethyl acetate and 0.1 g of N,N-dimethylaminopyridine were added to a suspension of 5.2 g of Compound 1f and 3.1 g of Compound 1g in 30 ml of ethyl acetate. The reaction system was allowed to react overnight. The resulting crystal was filtered off, and the filtrate was then concentrated. The resulting oily matter was purified through a silica gel column chromatography (effluent: 1/2 mixture of ethyl acetate and hexane) to obtain Compound (1) as coarse crystal. This compound was confirmed by mass spectrometry to give M^+ = 805 and hence have the structure of Compound (1).

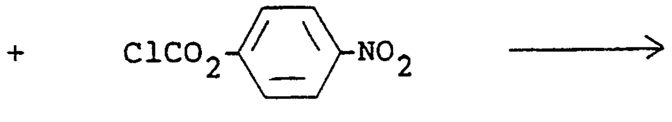
SYNTHESIS EXAMPLE 2



Compound 2a



Compound 2b



Compound (37)

Compound 2c

10 mmol of Compound 2b and 10 mmol of Compound 2c were added to 40 ml of methylene chloride and then reacted for 1 hour. A solution of 10 mmol of Compound 2a in 40 ml of ethyl acetate and 20 mmol of diisopropylethylamine were added to the system and then reacted with stirring for 1 hour. 20 ml of 2N

hydrochloric acid and 50 ml of water were added to the system to stop the reaction. The resulting material was then diluted with 40 ml of methylene chloride. An organic phase formed was washed with water three times, dried with sodium sulfate, and then concentrated to obtain a residue. The residue was confirmed by mass analysis the production of Compound 37 to give $M^+ = 847$.

The compounds represented by general formula (I) can be incorporated into any layer in the light-sensitive material, preferably a light-sensitive silver halide emulsion layer and/or its adjacent layers, more preferably a light-sensitive silver halide emulsion layer, particularly preferably a red-sensitive silver halide emulsion layer. The total amount of these compounds to be incorporated in the light-sensitive material is normally from 3×10^{-7} to 1×10^{-3} mol/m^2, preferably 3×10^{-6} to $5 \mathrm{X} 10^{-4}$ mol/m^2, more preferably 1×10^{-5} to 2×10^{-4} mol/m^2.

The compounds represented by general formula (I) can be incorporated into the light-sensitive material in the same manner as a conventional coupler, as described later.

The color photographic light-sensitive material of the present invention for photographing can comprise at least one blue-sensitive layer, at least one green-sensitive layer and at least one red-sensitive layer on a support. The number of silver halide emulsion layers and light-insensitive layers and the order of arrangement of these layers are not specifically limited. In a typical embodiment, the silver halide photographic material of the present invention comprises light-sensitive layers consisting of a plurality of silver halide emulsion layers having substantially the same color sensitivity and different light sensitivities on a support. The light-sensitive layers are unit light-sensitive layers having a color sensitivity to any of blue light, green light and red light. In the multilayer 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 depending on the application. Alternatively, two unit light-sensitive layers having the same color sensitivity can be arranged with a unit light-sensitive layer having a different color sensitivity interposed between them.

Light-insensitive layers such as various interlayers can be provided between these silver halide light-sensitive layers and on the uppermost layer and lowermost layer of the light-sensitive layers.

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 a two-layer structure, i.e., a high sensitivity emulsion layer and a 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 remotely from the support while a high sensitivity emulsion layer can be provided nearer to the support.

In one embodiment of the present invention, 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 side farthest from the support. In another embodiment, BH, BL, GL, GH, RH, and RL can be arranged in this order from the side farthest from the support. In a further embodiment, BH, BL, GH, GL, RL, and RH can be arranged in this order from the side farthest from the support.

As described in JP-B-55-34932 (the term "JP-B" as used herein refers to an "examined Japanese patent publication"), a blue-sensitive layer, GH, RH, GL, and RL can be arranged in this order from the side farthest 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 side farthest 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 arrangement, 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 side farthest from the support in a color-sensitive layer as described in JP-A-59-2024643.

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, the arrangement of the layers can be varied as described above.

In order to improve color reproducibility, a donor layer (CL) having an interimage effect and a different spectral sensitivity distribution from a main light-sensitive layer such as BL, GL and RL may be preferably provided adjacent or close to the main light-sensitive layer.

As described above, various layer structures and arrangements can be selected depending on the purpose of the light-sensitive material.

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

The silver halide grains in the photographic emulsions may be so-called regular grains having a regular crystal form, such as a cube, octahedron and tetradecahedron, or those having an irregular crystal form such as a spherical form or a tabular form, those having a crystal defect such as a 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 of up to about 10 μm. The emulsion may be either a monodisperse emulsion or a polydisperse emulsion.

The silver halide photographic emulsion which can be used in the present invention can be prepared by any suitable method as described, for example, in Research Disclosure, No. 17643 (December, 1978), pages 22 and 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 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, for example, in Gutoff, Photographic Science and Engineering, Vol. 14, pages 248 to 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 be fused to 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, for example, in Research Disclosure, Nos. 17643, 18716 and 307105 as tabulated below.

In the present invention, finely divided light-insensitive silver halide grains are preferably used in light-sensitive layers. Finely divided light-insensitive silver halide grains are finely divided silver halide grains which are not sensitive to light upon imagewise exposure for obtaining color images and are not substantially developed. Preferably, the finely divided light-insensitive silver halide grains are not previously fogged.

The finely divided light-insensitive silver halide grains for use in the light-insensitive layers have a silver bromide content of 0 to 100 mol% and may optionally contain silver chloride and/or silver iodide, preferably 0.5 to 10 mol% of silver iodide.

The finely divided light-insensitive silver halide grains in the light-insensitive layers preferably have an average grain diameter of 0.01 to 0.5 μm (as calculated in terms of average of diameters of projected area corresponding to sphere), more preferably 0.02 to 0.2 μm.

The preparation of the finely divided light-insensitive silver halide grains can be accomplished in the same manner as ordinary light-sensitive silver halide grains. In this case, the surface of the silver halide grains does not need to be optically sensitized. Also, the finally divided light-insensitive silver halide grains do not need to be spectrally sensitized. However, before being added to the coating solution, the finally divided light-insensitive silver halide emulsion preferably contains a known stabilizer such as a triazole, azaindene, benzothiazolium or mercapto compound.

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

	Additives	RD 17643 (December, 1978)	RD 18716 (November, 1979)	RD 307105 (November, 1989)
1.	Chemical Sensitizers	Page 23	Page 648, right column	Page 866
2.	Sensitivity Increasing Agents	—	Page 648, right column	—
3.	Spectral Sensitizers and Supersensitizers	Pages 23-24	Page 648, right column to page 649, right column	Pages 866-868
4.	Brightening Agents	Page 24	Page 647, right column	Page 868
5.	Antifoggants and Stabilizers	Pages 24-25	Page 649, right column	Pages 868-870
6.	Light Absorbers, Filter Dyes and Ultraviolet Absorbents	Pages 25-26	Page 649, right column to page 650, left column	Page 873
7.	Stain Inhibitors	Page 25, right column	Page 650, left to right columns	Page 872
8.	Dye Image Stabilizers	Page 25	Page 650, left column	Page 872
9.	Hardeners	Page 26	Page 651, left column	Pages 874-875
10.	Binders	Page 26	Page 651, left column	Pages 873-874

Additives	RD 17643 (December, 1978)	RD 18716 (November, 1979)	RD 307105 (November, 1989)
11. Plasticizers and Lubricants	Page 27	Page 650, right column	Page 876
12. Coating Aids and Surface Active Agents	Pages 26-27	Page 650, right column	Pages 875-876
13. Antistatic Agents	Page 27	Page 650, right column	Pages 876-877

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 into the light-sensitive material.

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

G and No. 307105, 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, JP-A-60-43659, JP-A-61-72238, JP-A-60-35730, JP-A-55-118034, and JP-A-60-185951, Research Disclosure, Nos. 24220 (June, 1984) and 24230 (June, 1984), and WO(PCT)88/04795.

Cyan couplers which can be used in the present invention include naphthol and phenol couplers. 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.

Typical examples of polymerized dye forming couplers are described in U.S. Patents 3,451,820, 4,367,282, 4,409,320, and 4,576,910, British Patent 2,102,173, and European Patent 341,188A.

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.

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 color by a fluorescent dye released upon coupling as described in U.S. Patent 4,774,181 and couplers containing as a separable 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 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, No. 17643, VII-F, and No. 307105, VII-F, JP-A-57-I51944, 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 compounds or DIR couplers or DIR coupler-releasing couplers 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 Research Disclosure, 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.

These couplers can be incorporated intp the light-sensitive material by any suitable known dispersion method, such as an oil-in-water dispersion process or a latex dispersion process.

High boiling solvents which can be used in the oil-in-water dispersion process suitable for use with the present invention 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, dicyclohexyl 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 organic solvent include ethyl acetate, butyl acetate, ethyl propionate, methyl ethyl ketone, cyclohexanone, 2-ethoxyethyl acetate, and dimethylformamide.

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

Various preservatives or antimolds such as 1,2-benzisothiazoline-3-one, n-butyl, p-hydroxybenzoate, phenol, 4-chloro-3,5-dimethylphenol, 2-phenoxyethanol, and 2-(4-thiazolyl)benzimidazole as described in JP-A-63-257747, JP-A-62-272248 and JP-A-1-80941 may be preferably incorporated into the color light-sensitive material of the present invention.

The present invention is applicable to various types of color light-sensitive materials, preferably to color negative films for ordinary 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, Nos. 17643 (page 28), 18716 (right column on page 647 to left column on page 648) and 307105 (page 879).

In the light-sensitive material of the present invention, the total thickness of all hydrophilic colloidal layers on the emulsion side is preferably 28 μm or less, more preferably 23 μm or less, furthermore preferably 18 μm or less, particularly preferably 16 μm or less. The film swelling rate $T_{\frac{1}{2}}$ is preferably 30 seconds or less, more preferably 20 seconds or less. 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 $T_{\frac{1}{2}}$ 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, pages 124 to 129. $T_{\frac{1}{2}}$ 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 $T_{\frac{1}{2}}$ can be adjusted by adding a film hardener to a gelatin binder or altering the aging condition after coating. The percentage of swelling of the light-sensitive material is preferably in the range of 150 to 400%. The percentage of 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 using conventional methods, such as described in Research Disclosure, Nos. 17643 (pages 28 and 29), 18716 (left column to right column on page 615) and 307105 (pages 880 and 881).

The color developer to be used in developing the light-sensitive material of the present invention is preferably an alkaline aqueous solution containing as a main component an aromatic primary amine color developing agent. As the color developing agent, an aminophenolic compound can be effectively used. In particular, p-phenylenediamine compounds are preferably used. Typical examples of such p-phenylenediamine compounds include 3-methyl-4-amino-N,N-diethylaniline, 3-methyl-4-amino-N-ethyl-N-β-hydroxyethylaniline, 3-methyl-4-amino-N-ethyl-N-β-methanesulfonamidoethylaniline, 3-methyl-4-amino-N-ethyl-N-β-methoxyethylaniline, and sulfates, hydrochlorides and p-toluenesulfonates thereof. Particularly preferred among these compounds is 3-methyl-4-amino-N-ethyl-N-β-hydroxyethylaniline sulfate. These compounds can be used in a combination of two or more thereof depending on the purpose of application.

The color developer normally contains a pH buffer such as a carbonate and a phosphate of an alkaline metal or a development inhibitor or fog inhibitor such as bromides, iodides, benzimidazoles, benzothiazoles and mercapto compounds. If desired, the color developer may further contain various preservatives, e.g., hydroxylamine, diethylhydroxylamine, sulfites, hydrazines (e.g., N,N-biscarboxymethyl hydrazine), phenylsemicarbazides, triethanolamine, and catechol sulfonic acids; organic solvents, e.g., ethylene glycol and diethylene glycol; development accelerators, e.g., benzyl alcohol, polyethylene glycol, quaternary ammonium salts, and amines; color forming couplers; competing couplers; auxiliary developing agents, e.g., 1-phenyl-3-pyrazolidone; viscosity imparting agents; various chelating agents exemplified by aminopolycarboxylic acids, aminopolyphosphoric acids, alkylphosphonic acids, and phosphonocarboxylic acids, e.g., ethylenediaminetetraacetic acid, nitrilotriacetic acid, diethylenetriaminepentaacetic acid, cyclohexanediaminetetraacetic acid, hydroxyethyliminoacetic acid, 1-hydroxyethylidene-1,1-diphosphonic acid, nitrilo-N,N,N-trimethylenephosphonic acid, ethylenediamine-N,N,N',N'-tetramethylenephosphonic acid, and ethylenediamine-di(o-hydroxyphenylacetic acid), and salts thereof.

Reversal processing is usually carried out by black-and-white development followed by color development. Black-and-white developers can contain one or more known black-and-white developing agents, such as dihydroxybenzenes, e.g., hydroquinone, 3-pyrazolidones, e.g., 1-phenyl-3-pyrazolidone, and aminophenols, e.g., N-methyl-p-aminophenol.

The color developer or black-and-white developer usually has a pH of from 9 to 12. The replenishment rate of the developer is usually 3 liters or less per m^2 of the light-sensitive material, although the rate depends on the type of color photographic material to be processed. The replenishment rate may be reduced to 500 ml/m^2 or less by decreasing the bromide ion concentration in the replenisher. When the replenishment rate is reduced, it is preferable to reduce the area of the liquid surface in contact with air in the processing tank to thereby prevent evaporation and air oxidation of the liquid.

The area of the liquid surface in contact with air can be referred to as the opening value defined as follows:

$$\text{Opening Value} = \frac{\text{Area of liquid surface in contact with air (cm}^2\text{)}}{\text{Volume of liquid (cm}^3\text{)}}$$

The opening value is preferably 0.1 or less, more preferably 0.001 to 0.05. The reduction of the opening value can be accomplished by providing a cover such as a floating cover on the surface of the photographicprocessing solution in the processing tank, or by a process which uses a mobile cover as described in JP-A-1-82033, or a slit development process as described in JP-A-63-216050. The reduction of the opening value can be applied not only to both the color development and black-and-white development but also to the subsequent steps such as bleaching, blixing, fixing, rinsing and stabilizing. The replenishment rate can also be reduced by a means for suppressing the accumulation of bromide ion in the developing solution.

The color development time is normally selected between 2 and 5 minutes. The color development time can be further reduced by carrying out color development at an elevated temperature and a high pH value with a color developing solution containing a high concentration of color developing agent.

The photographic emulsion layer which has been color developed is normally subjected to bleach. Bleaching may be carried out simultaneously with fixing (i.e., blixing), or these two steps may be carried out separately. For speeding up the processing, bleaching may be followed by blixing. Further, other embodiments, such as wherein two blixing baths are connected in series, blixing is preceded by fixing, and blixing is followed by bleaching may be selected according to purpose. Bleaching agents which can be used include compounds of polyvalent metals, e.g., iron(III), peroxides, quinones, and nitro compounds. Typical examples of these bleaching agents are organic complex salts of iron(III) with aminopolycarboxylic acids, e.g., ethylenediaminetetraacetic acid, diethylenetriaminepentaacetic acid, cyclohexanediaminetetraacetic acid, methyliminodiacetic acid, 1,3-diaminopropanetetraacetic acid, and glycol ether diaminetetraacetic acid, or citric acid, tartaric acid, malic acid, etc. Of these, aminopolycarboxylic acid iron(III) complex salts such as (ethylenediaminetetraacetato)iron-(III) complex salts are preferred for speeding up processing and preserving the environment. In particular, aminopolycarboxylic acid iron(III) complex salts are useful in both a bleaching solution and a blixing solution. The bleaching or blixing solution containing an aminopolycarboxylic acid iron(III) complex salt normally has a pH value of 4.0 to 8.0. For speeding up processing, it is possible to use a lower pH value.

The bleaching bath, blixing bath or a prebath thereof can contain, if desired, a bleaching accelerator. Examples of useful bleaching accelerators include compounds containing a mercapto group or a disulfide group as described in U.S. Patent 3,893,858, West German Patent 1,290,812, JP-A-53-32736, JP-A-53-57831, JP-A-53-37418,JP-A-53-72623, JP-A-53-95630, JP-A-53-95631, JP-A-53-104232, JP-A-53-124424, JP-A-53-141623, and JP-A-53-28426, and Research Disclosure, No. 17129 (July, 1978), thiazolidine derivatives as described in JP-A-50-140129, thiourea derivatives as described in U.S. Patent 3,706,561, iodides as described in West German Patent 1,127,715 and JP-A-58-16235, polyoxyethylene compounds as described in West German Patents 966,410 and 2,748,430, polyamine compounds as described in JP-B-45-8836, compounds as described in JP-A-49-40943, JP-A-49-59644, JP-A-53-94927, JP-A-54-35727, JP-A-55-26506, and JP-A-58-163940, and bromine ions. Of these compounds, compounds containing a mercapto group or disulfide group are preferred because of their great accelerative effects. In particular, the compounds disclosed in U.S. Patent 3,893,858, West German Patent 1,290,812, and JP-A-53-95630 are preferred. The compounds disclosed in U.S. Patent 4,552,834 are also preferred. The bleaching accelerators may be incorporated into the light-sensitive material. The bleaching accelerators are particularly effective for blixing color light-sensitive photographic materials.

The bleaching solution or blixing solution which can be used in the present invention may preferably contain an organic acid in addition to the above mentioned compounds for the purpose of inhibiting bleach stains. A particularly preferred organic acid is a compound having an acid dissociation constant (pKa) of 2 to 5. Specific examples of such an organic acid include acetic acid and propionic acid.

Fixing agents which can be used in the present invention include thiosulfates, thiocyanates, thioethers, thioureas, and a large amount of iodides. Of the thiosulfates normally used, ammonium thiosulfate has the broadest application. These thiosulfates may preferably be used in combination with thiocyanates, thioether compounds, thiourea or the like. As preservatives for the fixing bath or blixing bath there can be preferably used sulfites, bisulfites, carbonyl bisulfite adducts or sulfinic acid compounds as described in European Patent 294,769A. Further, various aminopolycarboxylic acids or organic phosphonic acids can be added to the fixing bath or blixing bath for the purpose of stabilizing the solution.

In the present invention, the fixing solution or blixing solution preferably contains a compound having a pKa of 6.0 to 9.0, preferably an imidazole, such as, for example, imidazole, 1-methylimidazole, 1-ethylimidazole and 2-methylimidazole, in an amount of 0.1 to 10 mol/liter.

The total desilvering time is preferably short provided that no insufficient desilvering takes place. The total desilvering time is preferably 1 to 3 minutes, more preferably 1 to 2 minutes. The desilvering temperature is usually 25 to 50° C, preferably 35 to 45° C. In this preferred temperature range, the desilvering rate can be improved, and the occurrence of stain after processing can be effectively inhibited.

In the desilvering step, agitation is preferably intensified as much as possible. In particular, agitation can be intensified by various methods. For example, the processing solution may be jetted to the surface of the emulsion layer in the light-sensitive material as described in JP-A-62-183460 and JP-A-62-183461. The agitating effect can be improved by a rotary means as described in JP-A-62-183461. Furthermore, the agitating effect can be improved by moving the light-sensitive material with the emulsion surface in contact with a wiper blade provided in the bath so that a turbulence occurs on the emulsion surface. Moreover, the agitation can be intensified by increasing the total circulated amount of processing solution.

An agitation improving method can be effectively applied to the bleaching bath, blixing bath or fixing bath. The improvement in agitation effect expedites the supply of bleaching agent, fixing agent or the like into the emulsion film, resulting in an improvement in de-silvering rate. The above mentioned agitation improving method is more effective when a bleaching accelerator is used. In this case, the agitation improving method can remarkably enhance the bleaching accelerating effect or eliminate the effect of inhibiting fixation by the bleaching accelerator.

An automatic developing machine suitable for use in the present invention is preferably equipped with a light-sensitive material conveying means as described in JP-A-60-191257, JP-A-60-191258 and JP-A-60-191259. As described in the above cited JP-A-60-191257, such a conveying means can remarkably reduce the amount of processing solution carried over from a bath to its succeeding bath, to thereby inhibit the deterioration of properties of the processing solution. Such an effect is particularly effective for reducing the processing time at each step or for reducing the replenishment rate of the processing solution.

It is usual that the thus desilvered silver halide color photographic materials of the present invention are subjected to washing and/or stabilization. The quantity of water to be used in the washing can be selected from a broad range depending on the characteristicsof the light-sensitive material (for example, the kind of couplers, etc.), the end use of the light-sensitive material, the temperature of washing water, the number of washing tanks (number of stages), the replenishment system (e.g., countercurrent flow system or cocurrent flow system), and other various factors. Of these factors, the relationship between the number of washing tanks and the quantity of water in a multistage countercurrent flow system can be obtained according to the method described in Journal of the Society of Motion Picture and Television Engineers, Vol. 64, pages 248 to 253 (May, 1955).

According to the multistage countercurrent flow system described in the above reference, although the requisite amount of water can be greatly reduced, bacteria would grow due to an increase of the retention time of water in the tank, and floating masses of bacteria would stick to the light-sensitive material. In the present invention, in order to deal with this problem, the method of reducing calcium and magnesium ion concentrations described in JP-A-62-288838 can be used effectively. Further, it is also effective to use isothiazolone compounds or thiabendazoles as described in JP-A-57-8542, chlorine type bactericides, e.g., chlorinated sodium isocyanurate, benzotriazole, and bactericides described in Hiroshi Horiguchi, Bokin Bobaizai no Kagaku, Eisei Gijutsu Gakkai (ed.), Biseibutsu no Mekkin, Sakkin, Bobaigijutsu, and Nippon Bokin Bobai Gakkai (ed.), Bokin Bobaizai Jiten (1986).

The washing water has a pH value of from 4 to 9, preferably from 5 to 8. The temperature of the water and the washing time can be selected from broad ranges depending on the characteristics and end use of the light-sensitive material, but the temperature usually ranges from 15 to 45°C and developing time from 20 seconds to 10 minutes, preferably from 25 to 40°C and from 30 seconds to 5 minutes. The light-sensitive material of the present invention may be directly processed with a stabilizer in place of the washing step. For the stabilization, any of the known techniques as described in JP-A-57-8543, JP-A-58-14834 and JP-A-60-220345 can be used.

The aforesaid washing step may be followed by stabilization in some cases. For example, a stabilizing bath containing a dye stabilizer and a surface active agent as is used as a final bath for color light-sensitive materials for photographing. Examples of such a dye stabilizer include aldehydes such as formalin and glutaraldehyde, N-methylol compounds, hexamethylenetetramine, and aldehyde-sulfurous acid adducts.

This stabilizing bath may also contain various chelating agents or bactericides.

The overflow accompanying replenishment of the washing bath and/or stabilizing bath can be reused in other steps such as desilvering.

In processing using an automatic developing machine, if the processing solution is concentrated due to evaporation, water may be preferably supplied to the system to make up for the evaporation.

The silver halide color light-sensitive material of the present invention may contain a color developing agent for the purpose of simplifying and expediting processing. Such a color developing agent is preferably used in the form of various precursors. Examples of such precursors include indoaniline compounds as described in U.S. Patent 3,342,597, Schiff's base type compounds as described in U.S. Patent 3,342,599, and Research Disclosure, Nos. 14850 and 15159, and aldol compounds as described in Research Disclosure, No. 13924, metal complexes as described in U.S. Patent 3,719,492, and urethane compounds as described in JP-A-53-135628.

The silver halide color light-sensitive material of the present invention may optionally comprise various 1-phenyl-3-pyrazolidones for the purpose of accelerating color development. Typical examples of such compounds are described in JP-A-56-64339, JP-A-57-144547 and JP-A-58-115438.

In the present invention, the various processing solutions are used at a temperature of 10°C to 50°C. The standard temperature range is normally from 33°C to 38°C. However, a higher temperature range can be used to accelerate processing to reduce the processing time. On the other hand, a lower temperature range can be used to improve the picture quality or the stability of the processing solutions.

The silver halide photographic material of the present invention can also be applied to a heat-developable light-sensitive material as described in U.S. Patent 4,500,626, JP-A-60-133449, JP-A-59-218443, and JP-A-61-238056, and European Patent 210,660A2.

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

A multilayer color light-sensitive material was prepared as Sample 101 by coating on an undercoated cellulose triacetate film support various layers having the following compositions.

Composition of Light-Sensitive 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 couplers, additives and gelatin is represented in g/m^2. The coated amount of sensitizing dyes is represented in mol per mol of silver halide contained in the same layer.

First Layer: Antihalation Layer	Coated Amount
Black Colloidal Silver	0.15
Gelatin	1.00
ExM-8	0.02

Second Layer: Interlayer	Coated Amount
Gelatin	1.20
UV-1	0.03
UV-2	0.06
UV-3	0.07
ExF-1	0.004
Solv-2	0.07

Third Layer: Low Sensitivity Red-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion	0.45 as Ag

(AgI content: 2 mol%, internal high AgI type, grain diameter: 0.3 μm (as calculated in terms of sphere), grain size fluctuation coefficient:

29% (as calculated in terms of sphere), mixture of regular crystal and twin, diameter/thickness ratio: 2.5)

Gelatin	1.0
ExS-1	1.0×10^{-4}
ExS-2	3.0×10^{-4}
ExS-3	1.0×10^{-5}
ExC-3	0.22
ExC-4	0.010
Solv-1	0.007

Fourth Layer: Middle Sensitivity Red-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion	0.80 as Ag

(AgI content: 4 mol%, internal high AgI type, grain diameter: 0.55 μm (as calculated in terms of sphere), grain size fluctuation coefficient: 20% (as calculated in terms of sphere), mixture of regular crystal and twin, diameter/thickness ratio: 1)

Gelatin	1.05
ExS-1	1.0×10^{-4}
ExS-2	3.0×10^{-4}
ExS-3	1.0×10^{-5}

ExC-3	0.33
ExC-4	0.005
ExY-14	0.008
ExY-13	0.02
ExC-2	0.08
Cpd-10	1.0×10^{-4}
Solv-1	0.10

Fifth Layer: High Sensitivity Red-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion (AgI content: 2 mol%, internal high AgI type, grain diameter, 0.7 µm (as calculated in terms of sphere), grain size fluctuation coefficient: 19% (as calculated in terms of sphere); mixture of twin, diameter/thickness ratio: 6)	0.60 as Ag
Gelatin	0.90
ExS-1	1.0×10^{-4}
ExS-2	3.0×10^{-4}
ExS-3	1.0×10^{-5}
ExC-5	0.07
ExC-6	0.08
Solv-1	0.15
Solv-2	0.08

Sixth Layer: Interlayer

	Coated Amount
Gelatin	0.60
P-2	0.05
Cpd-1	0.10
Cpd-4	0.17
Solv-1	0.05

Seventh Layer: Low Sensitivity Green-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion (AgI content: 2 mol%, internal high AgI type, grain diameter: 0.3 μm (as calculated in terms of sphere), grain size fluctuation coefficient: 28% (as calculated in terms of sphere), mixture of regular crystal and twin, diameter/thickness ratio: 2.5)	0.30 as Ag
Gelatin	0.40
ExS-4	5.0×10^{-4}
ExS-6	0.3×10^{-4}
ExS-5	2.0×10^{-4}
ExM-9	0.2
ExY-13	0.03
ExM-8	0.03
Solv-1	0.2

Eighth Layer: Middle Sensitivity Green-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion (AgI content: 4 mol%, internal high AgI type, grain diameter: 0.55 μm (as calculated in terms of sphere), grain size fluctuation coefficient: 20% (as calculated in terms of sphere), mixture of regular crystal and twin, diameter/thickness ratio: 4)	0.65 as Ag
Gelatin	0.90
ExS-4	5.0×10^{-4}
ExS-5	2.0×10^{-4}
ExS-6	0.3×10^{-4}
ExM-9	0.25
ExM-8	0.03
ExM-10	0.015
ExY-13	0.04
Solv-1	0.2

Ninth Layer: High Sensitivity Green-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion (AgI content: 10 mol%, internal high AgI type,	0.50 as Ag

grain diameter: 0.7 µm (as calculated in terms of sphere), grain size fluctuation coefficient: 30% (as calculated in terms of sphere), mixture of regular crystal and twin, diameter/thickness ratio: 2.0)

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

Tenth Layer: Yellow Filter Layer

	Coated Amount
Gelatin	0.55
Yellow Colloidal Silver	0.05
Cpd-1	0.18
Solv-1	0.15

Eleventh Layer: Low Sensitivity Blue-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion (AgI content: 4 mol%, internal high AgI type, grain diameter: 0.5 µm (as calculated in terms of sphere), grain size fluctuation coefficient: 15% (as calculated in terms of sphere), octahedral grain)	0.35 as Ag
Gelatin	1.0
ExS-8	2.0×10^{-4}
ExY-15	0.85
ExY-13	0.09
Cpd-2	0.01
Solv-1	0.28

Twelfth Layer: High Sensitivity Blue-Sensitive Emulsion Layer

	Coated Amount
Silver Bromoiodide Emulsion (AgI content: 10 mol%, internal high AgI type, grain diameter: 1.3 µm (as calculated in terms of sphere), grain size fluctuation coefficient: 25% (as calculated in terms of sphere), mixture of regular crystal and twin, diameter/thickness ratio: 4.5)	0.45 as Ag

Gelatin	0.50
ExS-8	1.0×10^{-4}
ExY-15	0.12
Cpd-2	0.001
Cpd-5	2.0×10^{-4}
Solv-1	0.04

Thirteenth Layer: First Protective Layer

	Coated Amount
Finely Divided Silver Bromoiodide (average grain diameter: 0.07 µm, AgI content: 1 mol%)	0.17
Gelatin	0.8
UV-2	0.1
UV-3	0.1
UV-4	0.2
Solv-3	0.04

Fourteenth Layer: Second Protective Layer

	Coated Amount
Gelatin	0.70
Polymethyl Methacrylate Grain (diameter: 1.5 µm)	0.18
H-1	0.35

In order to improve the preservability, processability, pressure resistance, antifungal and antibacterial properties, antistatic properties, and coating properties, Cpd-3, Cpd-5, Cpd-6, Cpd-7, Cpd-8, P-1, P-2, W-1, W-2 and W-3 as described later were incorporated in these layers. These fourteen layers were then coated simultaneously to a dried film thickness of 16.2 µm.

Samples 102 to 111

Sample 102 was prepared in the same manner as in Sample 101, except that Comparative Coupler RC-1 was incorporated in the third layer and fourth layer in amounts of 0.025 g/m^2 and 0.040 g/m^2, respectively.

Samples 103 to 111 were prepared in the same manner as in Sample 102, except that RC-1 was replaced by other comparative compounds and the compounds of the present invention represented by general formula (I), respectively. The type and amount (molar ratio relative to that of RC-1 as 1.0) of the compounds added are set forth in Table 1. These added amounts were properly adjusted so that the desired gradation (gamma) could be substantially met.

These samples were imagewise exposed to white light, and then subjected to the following color development. The results of the photographic properties are set forth with RMS values (value for cyan image obtained from an aperture with a diameter of 48 μm) indicating the graininess in Table 1. For evaluation of sharpness, these samples were similarly processed, and then subjected to MTF process measurement. Another batch of these samples were similarly exposed, allowed to stand under an artificial condition of a temperature of 45 °C and a relative humidity of 80% for 14 days, and then similarly developed. A further batch of these samples were imagewise exposed to light through a red filter (SC-62 available from Fuji Photo Film Co., Ltd.), uniformly exposed to light with 0.05 CMS through a green filter (BPN-45 available from Fuji Photo Film Co., Ltd.), and then developed. The color stain obtained by subtracting the magenta density at the cyan fog density from the magenta density at a cyan density of 1.5 is set forth in Table 1.

The color development was effected at a temperature of 38 °C by means of an automatic developing machine as follows:

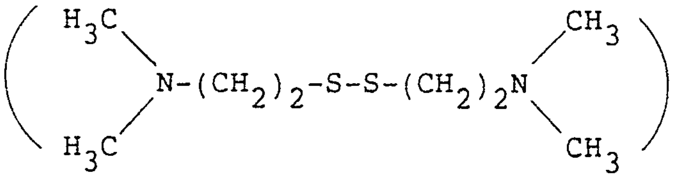
Color Development	3 min 15 sec
Bleaching	1 min
Blixing	3 min 15 sec
Washing (1)	40 sec
Washing (2)	1 min
Stabilization	40 sec
Drying (50°C)	1 min 15 sec

The washing step was effected in a counter-current process wherein the washing water flows from (2) to (1). The composition of the various processing solutions will be further described hereinafter.

The replenishment rate of the color developer was 1,200 ml per m^2 of color light-sensitive material. The replenishment rate of the other processing solutions were each 800 ml per m^2 of color light-sensitive material. The amount of the processing solution brought over into the washing step from the prebath was 50 ml per m^2 of color light-sensitive material.

Color Developer:	Mother Solution	Replenisher
Diethylenetriaminepentaacetic Acid	1.0 g	1.1 g
1-Hydroxyethylidene-1,1-diphosphonic Acid	2.0 g	2.2 g
Sodium Sulfite	4.0 g	4.4 g
Potassium Carbonate	30.0 g	32.0 g
Potassium Bromide	1.4 g	0.7 g
Potassium Iodide	1.3 mg	—
Hydroxylamine Sulfate	2.4 g	2.6 g
4-(N-Ethyl-N-β-hydroxyethylamino)-2-methylaniline Sulfate	4.5 g	5.0 g
Water to make	1.0 ℓ	1.0 ℓ
pH	10.0	10.05

Bleaching Solution: (The mother solution was used also as replenisher.)

Ferric Ammonium Ethylenediaminetetraacetate	120.0 g
Disodium Ethylenediaminetetraacetate	10.0 g
Ammonium Nitrate	10.0 g
Ammonium Bromide	100.0 g
Bleaching Accelerator 	5×10^{-3} mol
Aqueous Ammonia to make	pH 6.3
Water to make	1.0 liter

Blixing Solution: (The mother solution was used also as replenisher)

Ferric Ammonium Ethylenediaminetetraacetate	50.0 g
Disodium Ethylenediaminetetraacetate	5.0 g
Sodium Sulfite	12.0 g
Aqueous Solution of Ammonium Thiosulfate (700 g/liter)	240 ml
Aqueous Ammonia to make	pH 7.3
Water to make	1 liter

Washing Solution:

Tap water containing 32 mg/liter of calcium ion and 7.3 mg/liter of magnesium ion was passed through a column packed with an H-type strongly acidic cation exchange resin and an OH-type strongly basic anion exchange resin so that the calcium ion concentration and magnesium ion concentration were reduced down to 1.2 mg/liter and 0.4 mg/liter, respectively. Dichlorinated sodium isocyanurate was added to the solution in an amount of 20 mg/liter.

Stabilizing Solution: (The mother solution was used also as replenisher)

35% W/V Formalin	2.0 ml
Polyoxyethylene-p-monononylphenyl Ether (mean polymerization degree: 10)	0.3 g
Disodium Ethylenediaminetetraacetate	0.05 g
Water to make	1 liter
pH	5.8

Drying

The drying temperature was 50 ° C.

TABLE 1

Sample No.	Compound to Be Incorporated in Third and Fourth Layers		RMS x 1,000	MTF Cyan Image (25 cycle/mm)	Color Stain	After 45°C, 80% RH 14 Day Storage	
	Type	Amount				Fog Change*	Sensitivity Change**
101 (Comparison)	—	0	25.4	0.53	-0.01	+0.03	-0.04
102 (Comparison)	RC-1	1.0	23.5	0.65	-0.13	+0.08	-0.15
103 (Comparison)	RC-2	1.2	23.9	0.67	-0.15	+0.06	-0.12
104 (Comparison)	RC-3	0.60	22.9	0.57	-0.10	+0.06	-0.12
105 (Comparison)	RC-4	0.80	23.3	0.60	-0.04	+0.08	-0.14
106 (Comparison)	RC-5	0.12	22.7	0.62	-0.06	+0.05	-0.15
107 (Invention)	(1)	0.40	21.3	0.72	-0.06	+0.03	-0.05
108 (Invention)	(2)	0.60	21.6	0.71	-0.06	+0.03	-0.05
109 (Invention)	(3)	0.50	21.5	0.71	-0.06	+0.04	-0.05

T A B L E 1 (cont'd)

Sample No.	Compound to Be Incorporated in Third and Fourth Layers		RMS x 1,000	MTF Cyan Image (25 cycle/mm)	Color Stain	After 45°C, 80% RH 14 Day Storage	
	Type	Amount				Fog Change*	Sensitivity Change**
110 (Invention)	(5)	0.90	22.1	0.70	-0.07	+0.05	-0.07
111 (Invention)	(7)	0.30	21.3	0.72	-0.06	+0.03	-0.05

* Fog change in cyan density (increase: +)

** Relative value of logarithm of exposure at a cyan density (fog + 0.2) (increase: +)

It is obvious from Table 1 that the samples of the present invention exhibit an excellent sharpness represented by MTF value, an excellent graininess represented by RMS value, and a small change in photographic properties under a severe condition of 45° C and 80% RH while keeping the change in color stain small.

EXAMPLE 2

Sample 201 was prepared by incorporating Compound (1) of formula (I) of the present invention in the fourth layer and the fifth layer in Sample 105 in JP-A-1-214849 in amounts of 0.015 g/m^2 and 0.008 g/m^2, respectively. Similarly, Samples 202 to 206 were prepared in the same manner as in Sample 201, except that Compound (1) was replaced by comparative compounds and the compounds of the present invention, respectively. The type and amount (molar ratio relative to that of Compound (1) as 1.0) of the compounds added are set forth in Table 2. These samples were then irradiated with soft X-ray through an opening having a size of 500 μm × 4 cm and an opening having a size of 15 μm × 4 cm. For the measurement of edge effect, the cyan density ratio was determined at the center point of each opening. The results are set forth in Table 2. Table 2 shows that the samples of the present invention exhibit an excellent effect, i.e., excellent sharpness.

The development was effected in accordance with the following steps with the following processing solutions by mean of an automatic processing machine for motion picture film.

For evaluation of photographic properties, samples which had been imagewise exposed to light were processed until the accumulated replenishment of the color developer reached three times the capacity of the mother solution tank.

Processing Step:

Step	Time	Temperature (°C)	Replenishment Rate* (ml)	Tank Capacity (liter)
Color Development	3 min 15 sec	38	23	15
Bleaching	50 sec	38	5	5
Blixing	50 sec	38	—	5
Fixing	50 sec	38	16	5
Washing (1)	30 sec	38	—	3
Washing (2)	20 sec	38	34	3
Stabilization	20 sec	38	20	3
Drying	1 min	55		

* Determined per 35 mm width and 1 m length

The washing step was effected in a counter-current process wherein the washing water flows from (2) to (1). The overflow from the washing tanks were all introduced into the fixing bath. In the automatic developing machine, the upper portion of the bleaching bath and the lower portion of the blixing bath, and the upper portion of the fixing bath and the lower portion of the blixing bath were connected to each other via a pipe so that the overflow produced by the supply of the replenisher to the bleaching bath and the fixing bath flowed entirely into the blixing bath. The amount of the developer brought over to the bleaching step, the amount of the bleaching solution brought over to the blixing step, the amount of the blixing solution brought over to the fixing step, and the amount of the fixing solution brought over to the washing step were 2.5 ml, 2.0 ml, 2.0 ml, and 2.0 ml per m of 35 mm wide light-sensitive material, respectively. The time for crossover was 5 seconds in all the steps. This crossover time is included in the processing time at the previous step. At each processing step, the processing solution was jetted to collide with the emulsion surface of the light-sensitive material by a method as described in JP-A-62-18346.

The various processing solutions had the following compositions:

Developer:	Mother Solution	Replenisher
Diethylenetriaminepentaacetic Acid	2.0 g	2.2 g
1-Hydroxyethylidene-1,1-diphosphonic Acid	3.3 g	3.3 g
Sodium Sulfite	3.9 g	5.2 g
Potassium Carbonate	37.5 g	39.0 g
Potassium Bromide	1.4 g	0.4 g
Potassium Iodide	1.3 mg	—
Hydroxylamine Sulfate	2.4 g	3.3 g
2-Methyl-4-[N-ethyl-N-(β-hydroxyethyl)amino]aniline Sulfate	4.5 g	6.1 g
Water to make	1.0 ℓ	1.0 ℓ
pH	10.05	10.15

Bleaching Solution:	Mother Solution	Replenisher
Ferric Ammonium 1,3-propylenediaminetetraacetate Monohydrate	144.0 g	206.6 g
Ammonium Bromide	84.0 g	120.0 g
Ammonium Nitrate	17.5 g	25.0 g
Hydroxyacetic Acid	63.0 g	90.0 g
Acetic Acid	33.2 g	47.4 g
Water to make	1.0 ℓ	1.0 ℓ
Aqueous Ammonia to make	pH 3.20	pH 2.80

Blixing Solution: (The mother solution was also used as replenisher)

A 15/85 mixture of the above mentioned mother solution of bleaching solution and the mother solution of the following fixing solution was used as the mother solution of the blixing solution.

Fixing Solution:	Mother Solution	Replenisher
Ammonium Sulfite	19.0 g	57.0 g
Aqueous Solution of Ammonium Thiosulfate (700 g/liter)	280 ml	840 ml
Imidazole	28.5 g	85.5 g
Ethylenediaminetetraacetic Acid	12.4 g	37.5 g
Water to make	1.0 ℓ	1.0 ℓ
Aqueous Ammonia and Acetic Acid to make	pH 7.40	pH 7.45

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 available from Rohm & Haas) and an OH-type strongly basic anion exchange resin (Amberlite IRA-400 available from Rohm & Haas) so that the calcium ion concentration and magnesium ion concentration were each reduced to 3 mg/liter or less. Dichlorinated sodium isocyanurate and sodium sulfate were then added to the solution in amounts of 20 mg/liter and 150 mg/liter, 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)

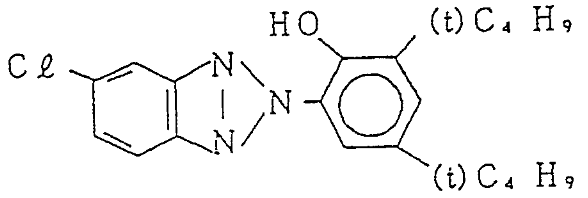
37% W/V Formalin	2.0 ml
Polyoxyethylene-p-monononylphenyl Ether (mean polymerization degree: 10)	0.3 g

TABLE 2

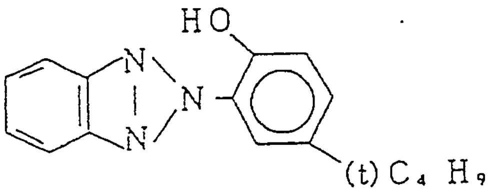
Sample No.	Compound Incorporated in Fourth and Fifth Layers Type	Amount	Cyan Density Ratio (15 µm × 4 cm / 500 µm × 4 cm)
201 (Invention)	(1)	1.0	1.52
202 (Invention)	(3)	1.2	1.51
203 (Invention)	(8)	0.9	1.51
204 (Invention)	(10)	1.6	1.48
205 (Comparison)	RC-2	2.5	1.37
206 (Comparison)	RC-5	0.6	1.40

The chemical name and chemical structure of the compounds identified and used in Examples 1 and 2 are set forth below:

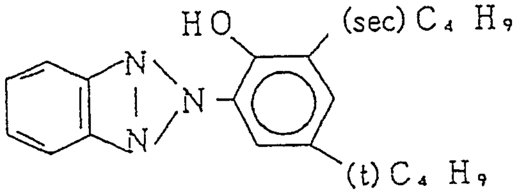
UV-1



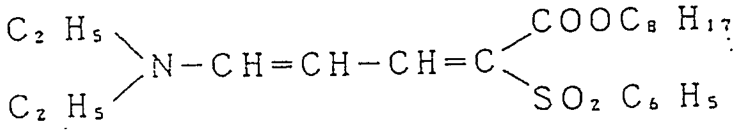
UV-2



UV-3



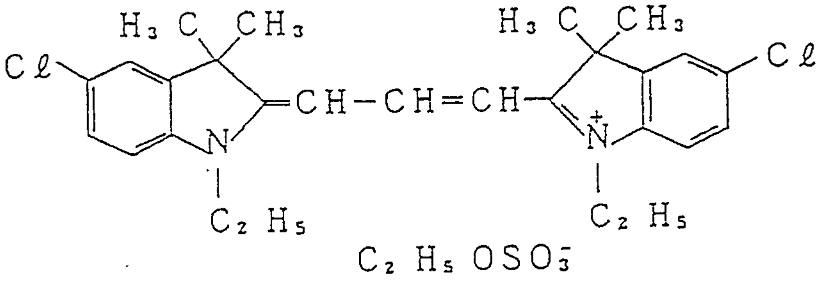
UV-4 :



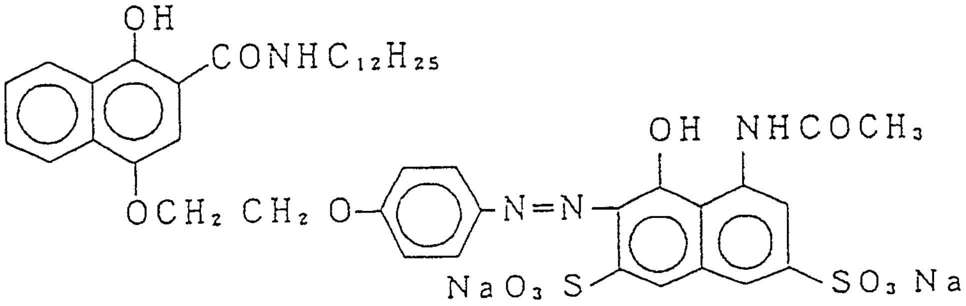
$$\begin{array}{l} C_2H_5 \\ C_2H_5 \end{array}\!\!>N-CH=CH-CH=C<\!\!\begin{array}{l} COOC_8H_{17} \\ SO_2C_6H_5 \end{array}$$

Solv-1: Tricresyl phosphate
Solv-2: Dibutyl phthalate
Solv-3: Tri(2-ethylhexyl) phosphate

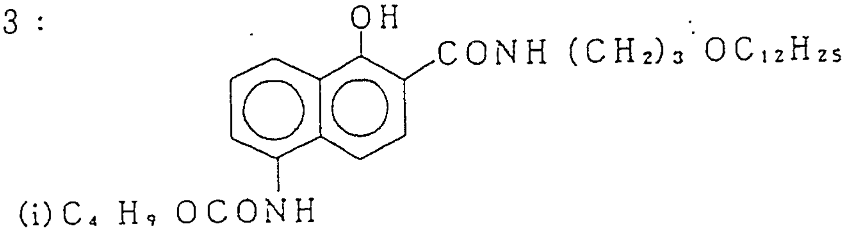
ExF-1:



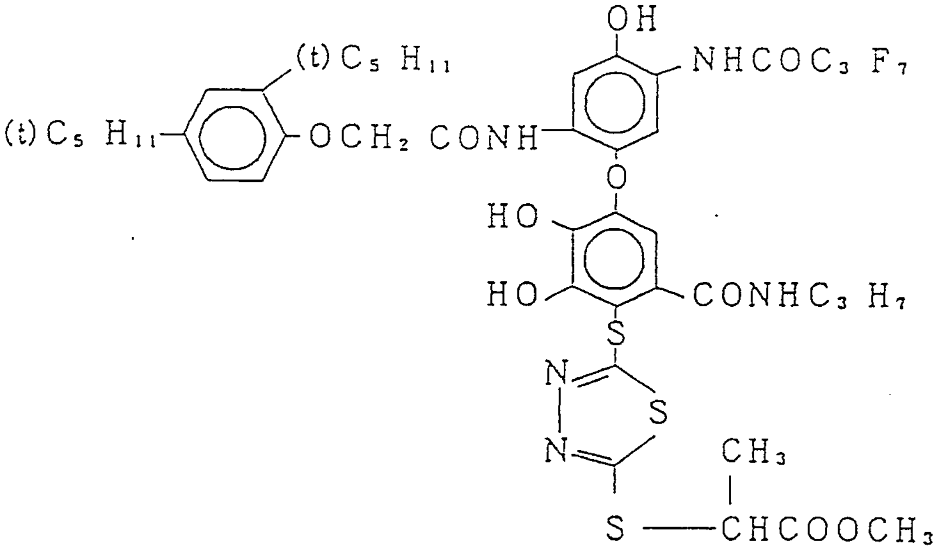
ExC-2:



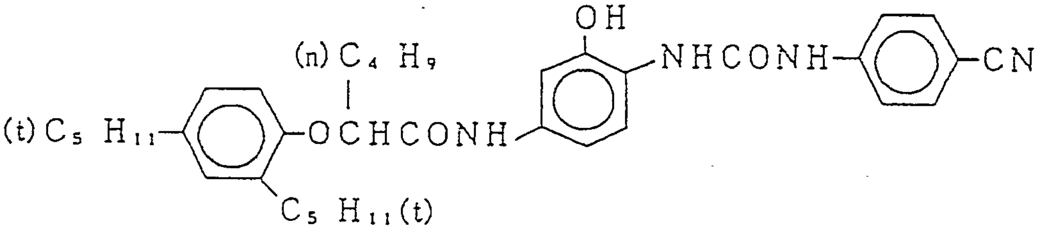
ExC-3:



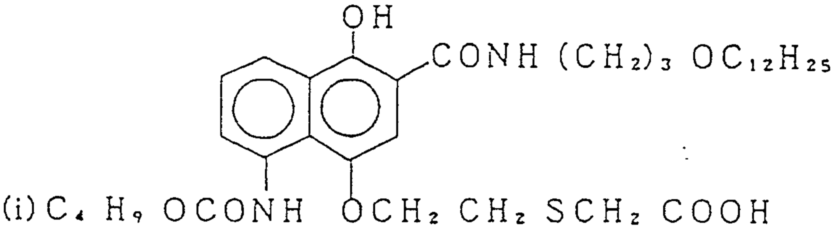
ExC−4 :



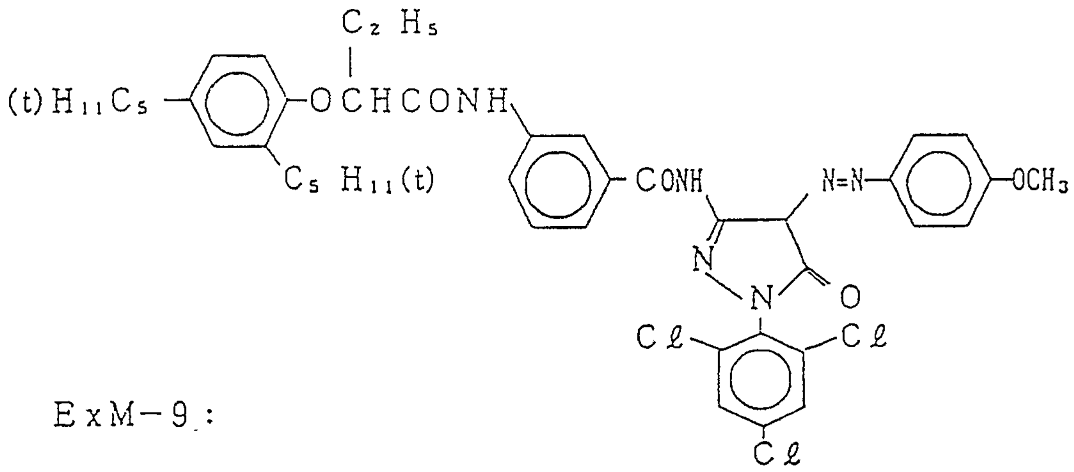
ExC−5 :



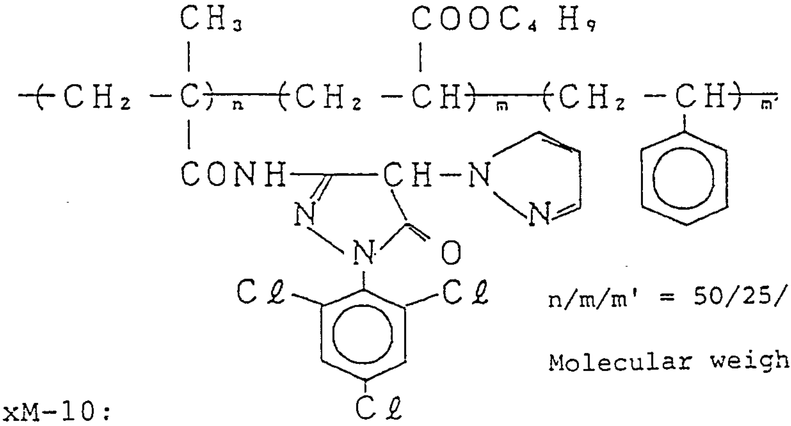
ExC−6 :



ExM-8 :



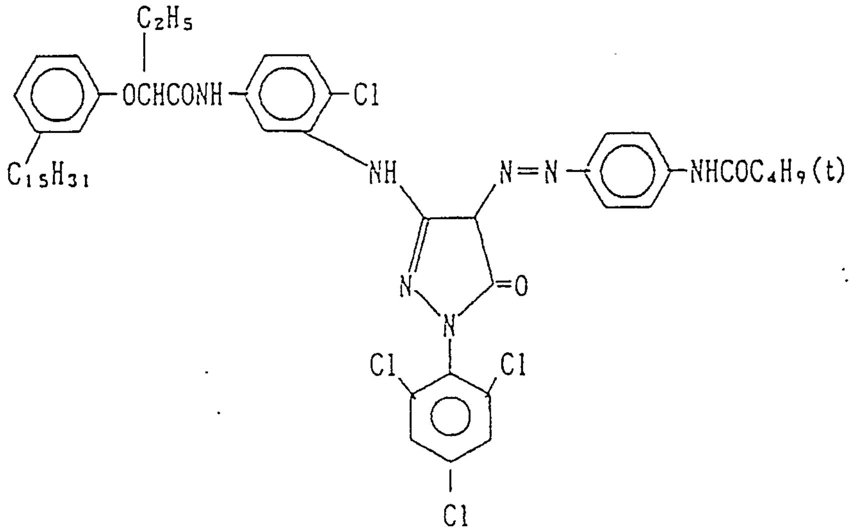
ExM-9 :



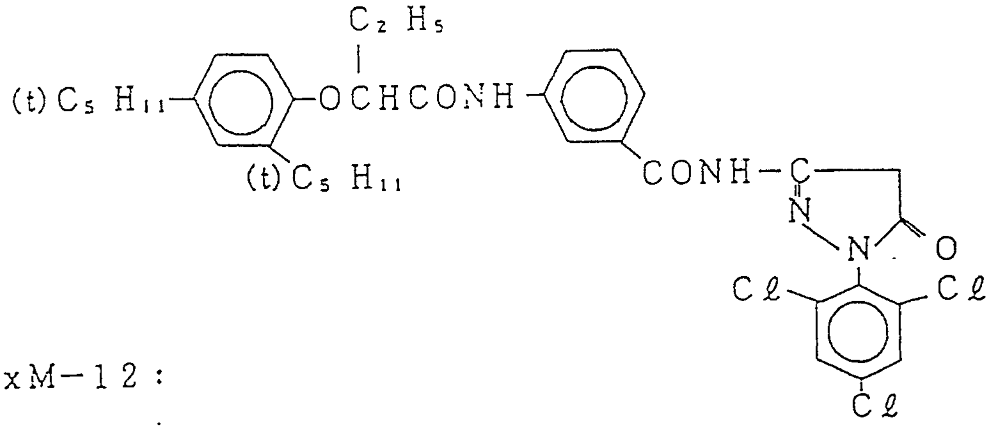
n/m/m' = 50/25/25 (weight ratio)

Molecular weight = about 20,000

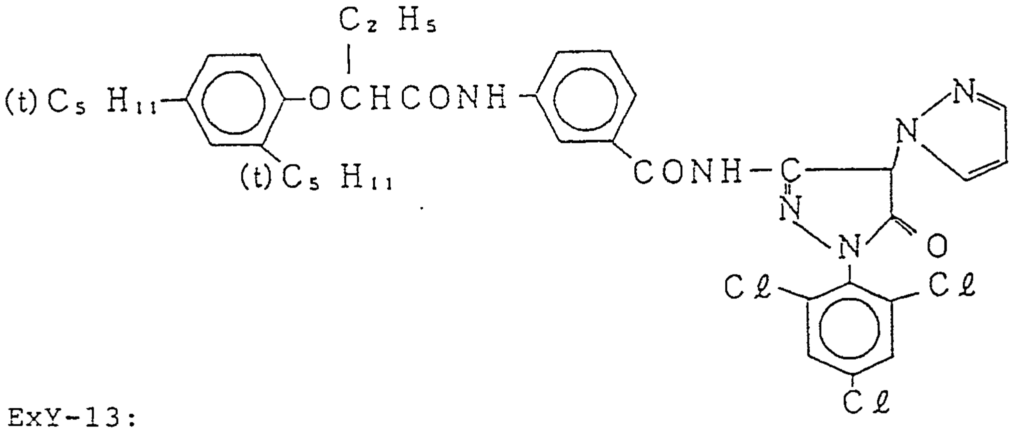
ExM-10:



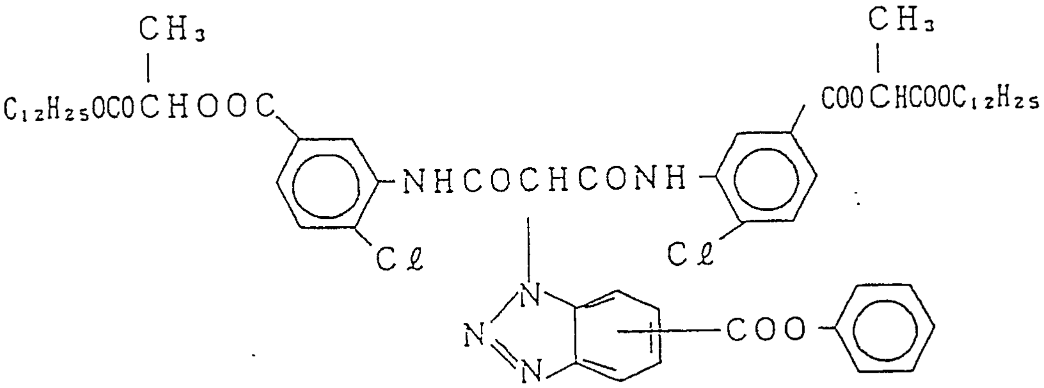
ExM-11:



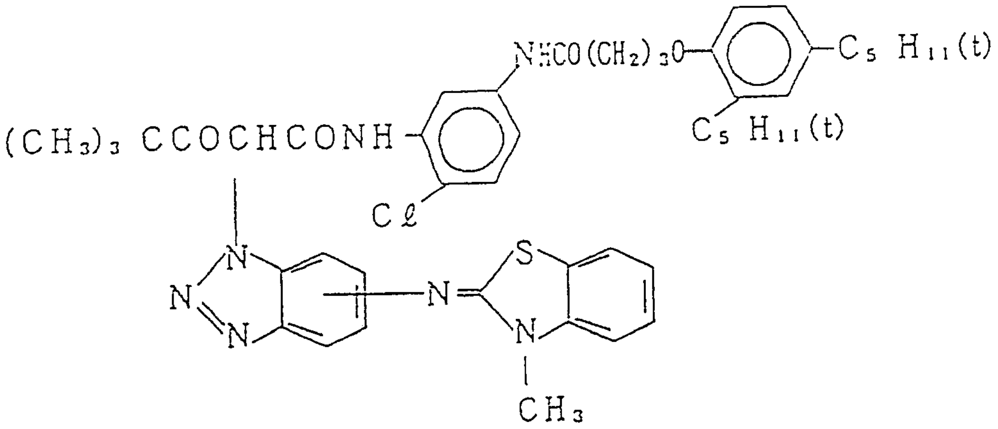
ExM-12:



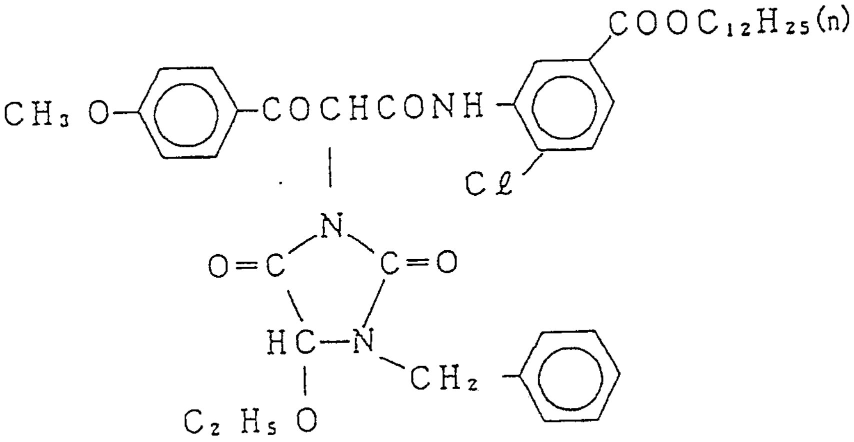
ExY-13:



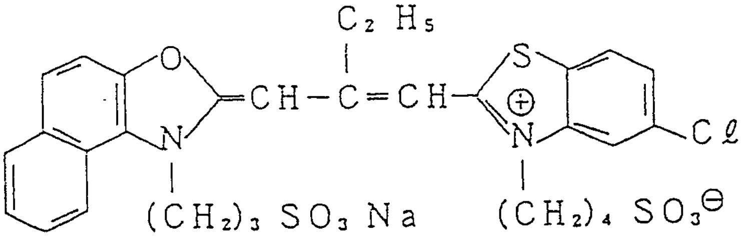
ExY－14：


NHCO(CH₂)₃O
C₅H₁₁(t)
C₅H₁₁(t)
(CH₃)₃CCOCHCONH
Cℓ
N
N
N
N=
S
N
CH₃

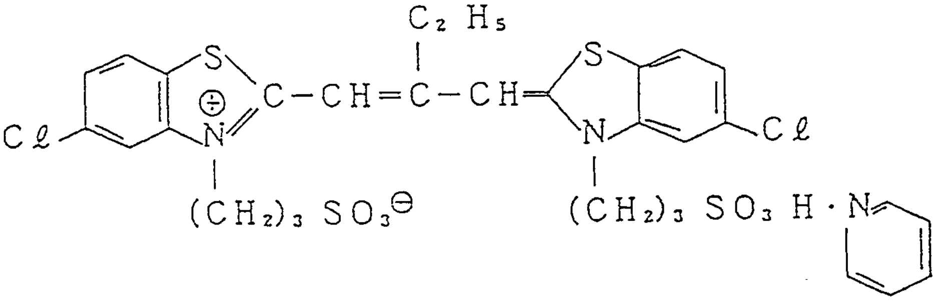
ExY－15：


COOC₁₂H₂₅(n)
CH₃O
COCHCONH
Cℓ
N
O=C
C=O
HC—N
CH₂
C₂H₅O

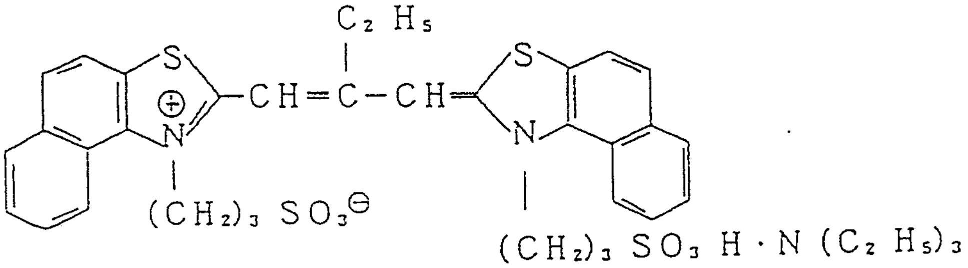
ExS−1 :



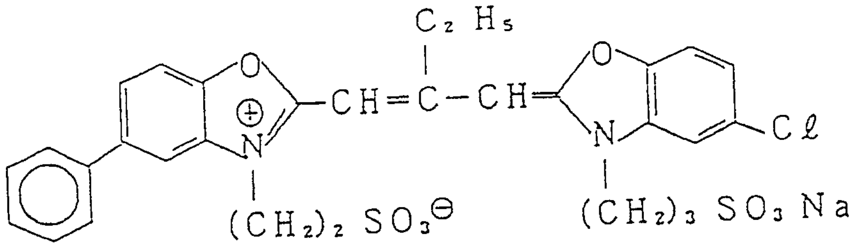
ExS−2 :



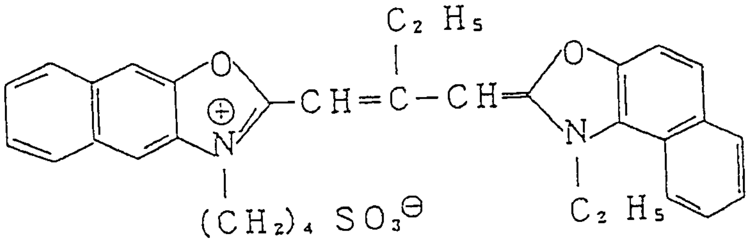
ExS−3 :



ExS−4 :



ExS−5 :



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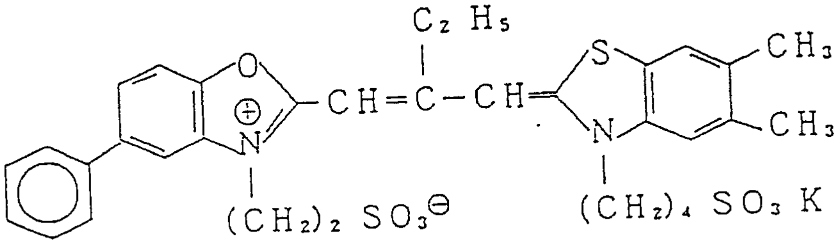
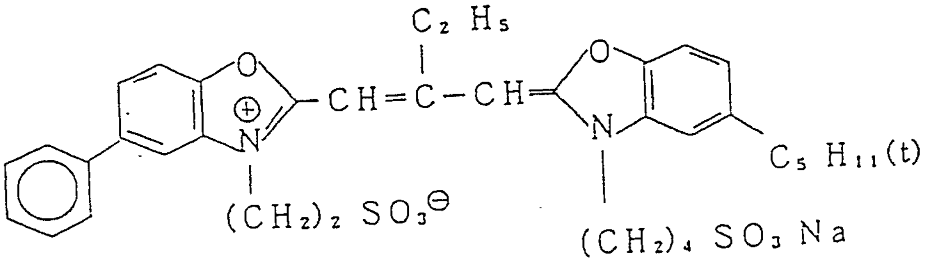
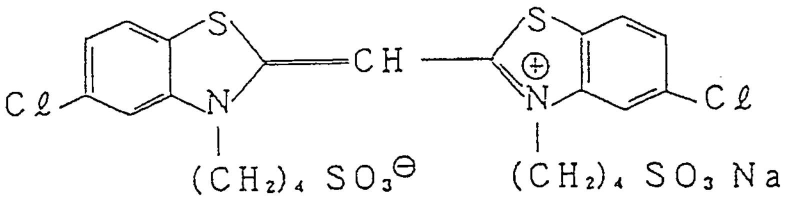


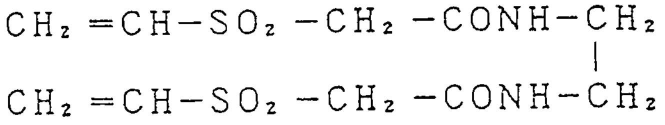
ExS−7 :



ExS-8:

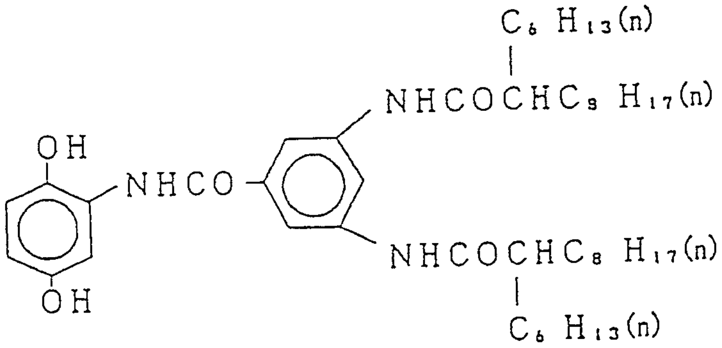


H-1:

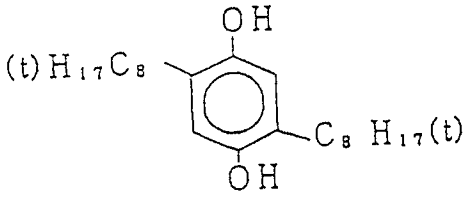


$$\begin{array}{l} \mathrm{CH_2=CH-SO_2-CH_2-CONH-CH_2} \\ \hspace{14.5em}| \\ \mathrm{CH_2=CH-SO_2-CH_2-CONH-CH_2} \end{array}$$

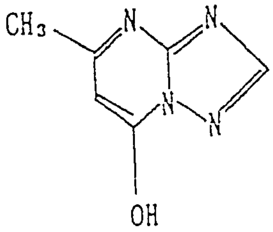
Cpd-1:



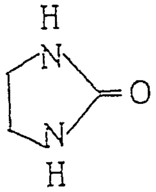
Cpd-2 :



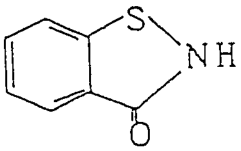
Cpd-3 :



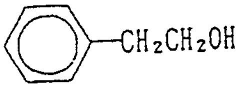
Cpd-4 :



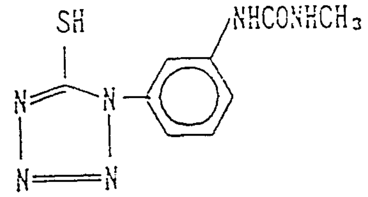
Cpd-5 :



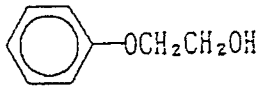
Cpd-6



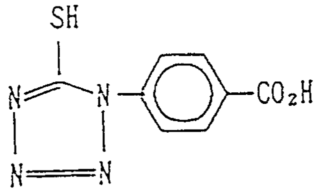
Cpd-7



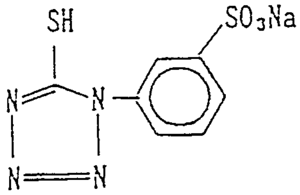
Cpd-8



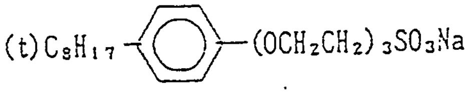
Cpd-9



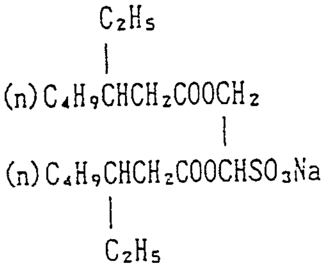
Cpd-10



W-1



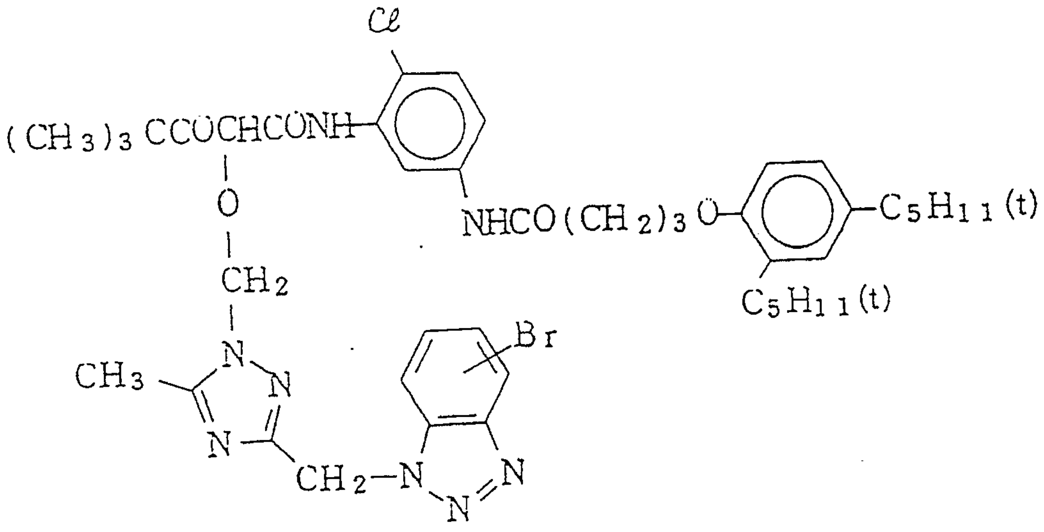
W-2



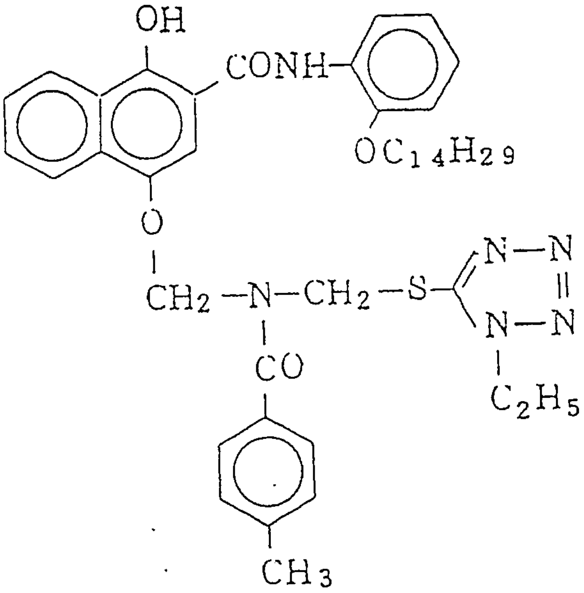
$$\begin{array}{l} \qquad C_2H_5 \\ \qquad | \\ (n)C_4H_9CHCH_2COOCH_2 \\ \qquad\qquad\qquad\quad | \\ (n)C_4H_9CHCH_2COOCHSO_3Na \\ \qquad | \\ \qquad C_2H_5 \end{array}$$

W-3 $C_8F_{17}SO_2N(C_3H_7)CH_2COOK$

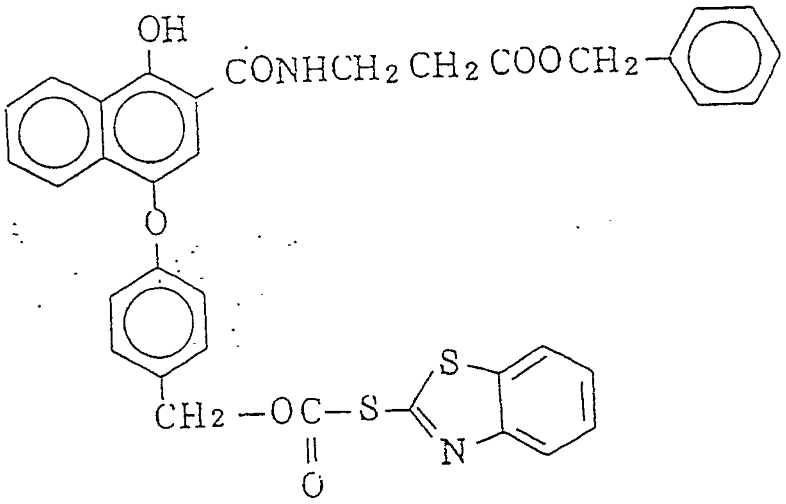
P-1 Copolymer of vinyl pyrrolidone and vinyl alcohol (copolymerization ratio = 70/30 (by weight))
P-2 Polyethyl acrylate
RC-1 Coupler (19) as disclosed in JP-A-60-218645



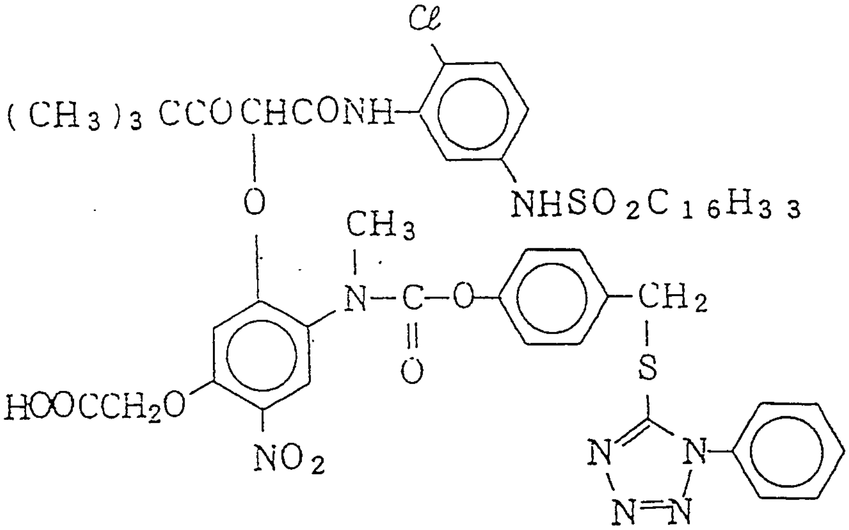
RC-2 Coupler (1) as disclosed in JP-A-60-249148



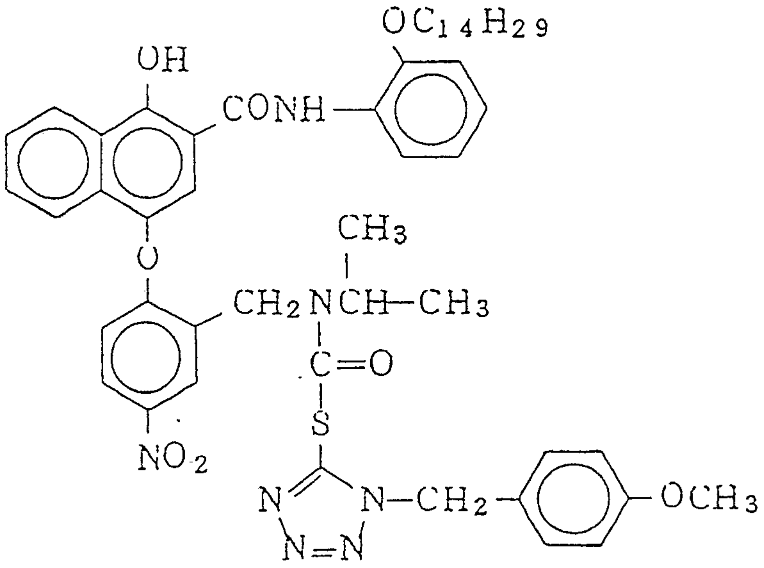
RC-3 Coupler (26) as disclosed in JP-A-61-156127



RC-4 Compound 5 as disclosed in U.S. Patent 4,861,701



RC-5 Compound 2 as disclosed in published European Patent Application 348,139



EXAMPLE 3

A sample was prepared by incorporating Compounds (1), (3) and (7) of formula (I) of the present invention into the third layer in Sample 101 in JP-A-1-243056 in amounts of 4 x 10^{-5} mol/m^2, respectively. The sample was tested in the same manner as in Example 1. As a result, it was confirmed that the incorporation of the compounds of the present invention provides light-sensitive materials with an excellent graininess, sharpness and preservability.

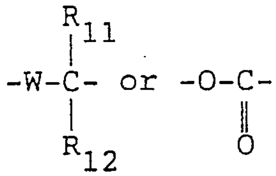
While the invention has been described in detail and with reference to specific embodiments thereof, it will be apparent to one skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope thereof.

Claims

1. A silver halide color photographic material comprising on a support at least one silver halide emulsion layer, wherein the material contains a compound represented by general formula (I):

   $A\text{-}L_1\text{-}L_2\text{-}INH\text{-}(CH_2)_n\text{-}Q$ (I)

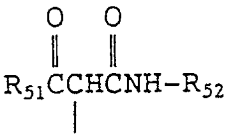
   wherein A represents a coupler residue excepting 1H-pyrazolo[1,5-*b*]-1,2,4-triazole and 1H-pyrazolo[5,1-*c*]-1,2,4-triazole; L_1 represents

   $$-W-\overset{R_{11}}{\underset{R_{12}}{C}}- \text{ or } -O-\underset{\displaystyle O}{\overset{}{\underset{\|}{C}}}-$$

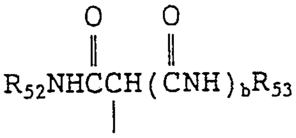
   in which W represents an oxygen atom, a sulfur atom or a tertiary amino group, and R_{11} and R_{12} each independently represents a hydrogen atom or a substituent; L_2 represents a group which undergoes electron migration along a conjugated system to release INH-(CN$_2$)$_n$-Q; INH represents a development inhibitor residue bonded to L_2 via a hetero atom; n represents an integer of 0 to 3; and Q represents a group having a molecular weight of 80 to 250.

2. The silver halide color photographic material as in claim 1, wherein group A in general formula (I) is represented by general formulae (CP-1) to (CP-10):



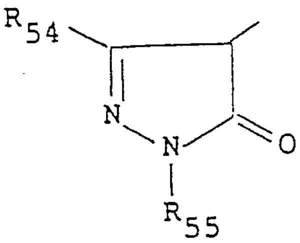
$R_{51}\overset{O}{\overset{\|}{C}}\underset{|}{C}H\overset{O}{\overset{\|}{C}}NH-R_{52}$

(Cp-1)

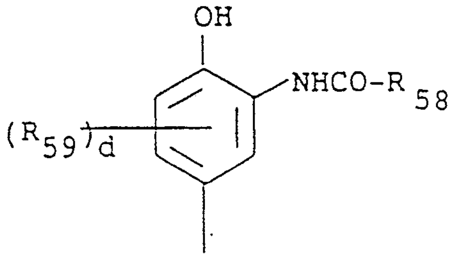


$R_{52}NH\overset{O}{\overset{\|}{C}}\underset{|}{C}H(\overset{O}{\overset{\|}{C}}NH)_{b}R_{53}$

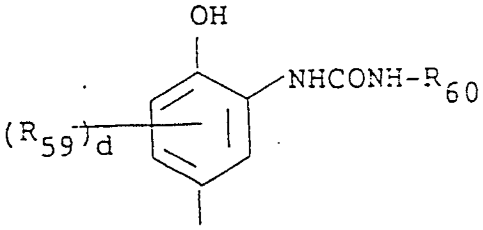
(Cp-2)



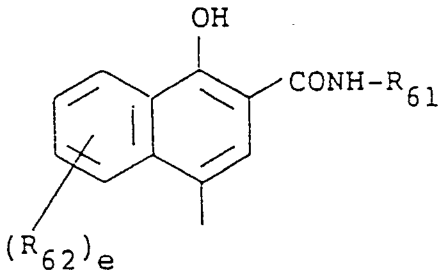
(Cp-3)



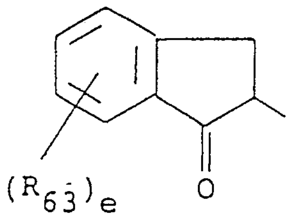
(Cp-6)



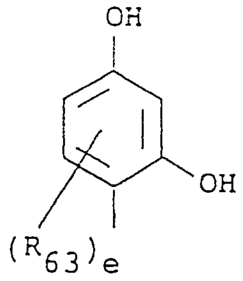
(Cp-7)



(Cp-8)

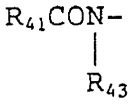


(Cp-9)



(Cp-10)

wherein the free bonds in the coupling position each represents the position where a coupling separable group is bonded; R_{41} represents an aliphatic group, an aromatic group or a heterocyclic group; R_{42} represents an aromatic group or a heterocyclic group R_{43}, R_{44} and R_{45} each represents a hydrogen atom, an aliphatic group, an aromatic group or a heterocyclic group; R_{51} has the same meaning as R_{41}; the suffix b represents an integer 0 or 1; R_{52} and R_{53} each has the same meaning as R_{42}; R_{54} has the same meaning as R_{41} or represents an

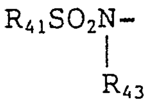


$$R_{41}CO\underset{\substack{|\\ R_{43}}}{N}-$$

group, an

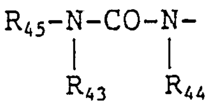
$$R_{41}\underset{\substack{|\\ R_{43}}}{N}-$$

group, an



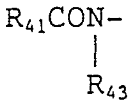
$$R_{41}SO_2\underset{\substack{|\\ R_{43}}}{N}-$$

group, an $R_{41}S$- group, an $R_{43}O$- group, an



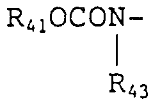
$$R_{45}-\underset{\substack{|\\ R_{43}}}{N}-CO-\underset{\substack{|\\ R_{44}}}{N}-$$

group or an N≡C-group;R_{55} has the same meaning as R_{41}; R_{58} has the same meaning as R_{41}; R_{59} has the meaning as R_{41} or represents an



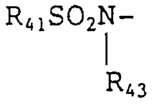
$R_{41}CO\underset{\substack{|\\ R_{43}}}{N}-$

group, an



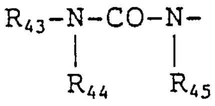
$R_{41}OCO\underset{\substack{|\\ R_{43}}}{N}-$

group, and



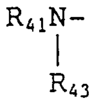
$R_{41}SO_2\underset{\substack{|\\ R_{43}}}{N}-$

group, an



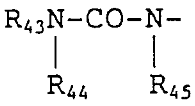
$R_{43}-\underset{\substack{|\\ R_{44}}}{N}-CO-\underset{\substack{|\\ R_{45}}}{N}-$

group, an $R_{41}O$- group, an $R_{41}S$- group, a halogen atom or an



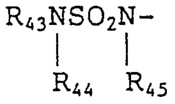
$R_{41}\underset{\substack{|\\ R_{43}}}{N}-$

group; the suffix d represents an integer 0 to 3; R_{60} has the same meaning as R_{41}; R_{61} has the same meaning as R_{41} or represents an $R_{41}OCONH$- group, an R_4SO_2NH- group, an



$R_{43}\underset{\substack{|\\ R_{44}}}{N}-CO-\underset{\substack{|\\ R_{45}}}{N}-$

group, an

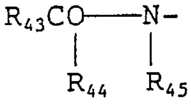


$R_{43}\underset{\substack{|\\ R_{44}}}{N}SO_2\underset{\substack{|\\ R_{45}}}{N}-$

group, an R_{43} O- group, an $R_{41}S$-group, a halogen atom or an

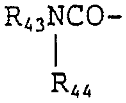
$R_{41}\underset{\substack{|\\ R_{43}}}{N}-$

group; R_{63} has the same meaning as R41 or represents an



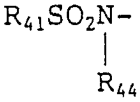
$$\underset{\displaystyle R_{44}}{R_{43}CO}-\underset{\displaystyle R_{45}}{N}-$$

group, an



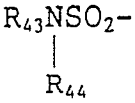
$$R_{43}\underset{\displaystyle R_{44}}{N}CO-$$

group, an



$$R_{41}SO_2\underset{\displaystyle R_{44}}{N}-$$

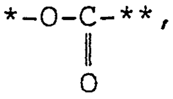
group, and



$$R_{43}\underset{\displaystyle R_{44}}{N}SO_2-$$

group, $R_{41}SO_2$- group, an $R_{43}OCO$- group, an $R_{43}O$-SO_2- group, a halogen atom, a nitro group, a cyano group or R_{43} CO- group; and suffix e represents an integer 0 to 4.

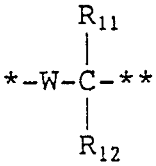
3. The silver halide color photographic material as in claim 1, wherein L_1 in general formula (I) is



$$*-O-\underset{\displaystyle \| \atop O}{C}-**,$$

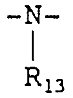
in which * represents the position where L_1 is bonded to A in general formula (I), and ** represents the position where L_1 is bonded to L_2 in general formula (I).

4. The silver halide color photographic material as in claim 1, wherein L_1 in general formula (I) is represented by general formula (T-1):



$$*-W-\overset{\displaystyle R_{11}}{\underset{\displaystyle R_{12}}{C}}-** \qquad (T\text{-}1)$$

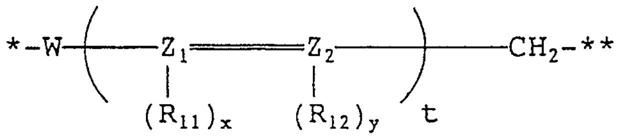
in which * represents the position where (T-1) is bonded to A in general formula (I) and ** represents the position where (T-1) is bonded to L_2 in general formula (I); W represents an oxygen atom a sulfur atom or an



$$-\underset{\displaystyle R_{13}}{\underset{|}{N}}-$$

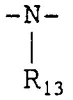
group; and in which R_{11} and R_{12} each independently represents a hydrogen atom or a substituent; and R_{13} represents a substituent.

5. The silver halide color photographic material as in claim 1, wherein L_2 in general formula (I) is represented by general formula (T-2):



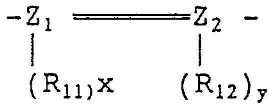
$$*-W\left(\underset{(R_{11})_x}{\underset{|}{Z_1}}=\underset{(R_{12})_y}{\underset{|}{Z_2}}\right)_t-CH_2-** \qquad (T\text{-}2)$$

in which W represents an oxygen atom, a sulfur atom or an



$$-\underset{\displaystyle R_{13}}{\underset{|}{N}}-$$

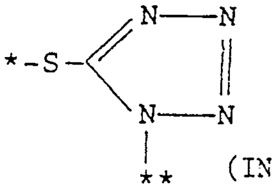
group, in which R_{13} represents a substituent; R_{11} and R_{12} each independently represents a hydrogen atom or a substituent; * represents the position where (T-2) is bonded to L_1 in general formula (I); ** represents the position where (T-2) is bonded to $INH(CH_2)_nQ$ in general formula (I); R_{11} and R_{12} may be connected to each other to form a benzene ring or a heterocyclic ring; Z_1 and Z_2 each independently represents a carbon atom or a nitrogen atom; suffixes x and y each independently represents an integer 0 or 1; and suffix t represents an integer 1 or 2, and when t is 2, the two



$$-\underset{(R_{11})x}{\underset{|}{Z_1}}=\underset{(R_{12})_y}{\underset{|}{Z_2}}-$$

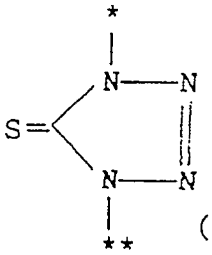
groups may be the same or different.

6. the silver halide color photographic material as in claim 1, wherein INH is general formula (I) is represented by (INH-1A), (INH-1B), (INH-3A) or (INH-3B):

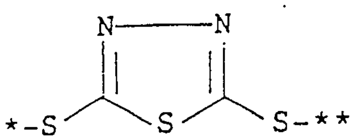


(INH-1A)

or

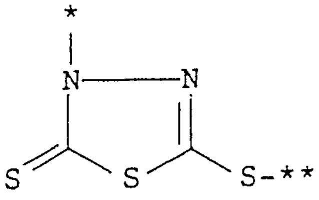


(INH-1B)



(INH-3A)

or



(INH-3B)

wherein * represents the position where INH is bonded to L_2 in general formula (I) and ** represents the position where INH is bonded to $-(CH_2)_n-Q$ in general formula (I).

7. The silver halide color photographic material as in claim 1, wherein Q in general formula (I) represents a group having a molecular weight of 90 to 200.

8. The silver halide color photographic material as in claim 7, wherein Q in general formula (I) represents a group having a molecular weight of 100 to 150.

9. The silver halide color photographic material as in claim 1, wherein n in general formula (I) represents an integer 0 to 1.

10. The silver halide color photographic material as in claim 1, wherein the total amount of the compound of formula (I) in the material is from 3×10^{-7} to 1×10^{-3} mol/m^2.

11. The silver halide color photographic material as in claim 10, wherein the total amount of the compound of formula (I) in the material is from 3×10^{-6} to 5×10^{-4} mol/m^2.

12. The silver halide color photographic material as in claim 10, wherein the total amount of the compound of formula (I) in the material is from 1×10^{-5} to 2×10^{-4} mol/m^2.