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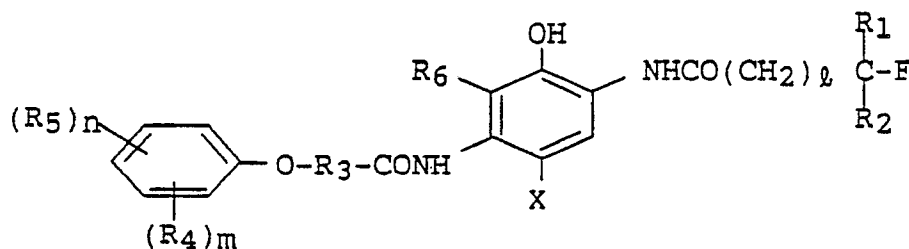
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D-8000 München 22(DE)(54) **Silver halide color reversal photographic light-sensitive material.**

(57) A silver halide color reversal photographic light-sensitive material comprising, on a support, at least one red-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one blue-sensitive silver halide emulsion layer, wherein at least one coupler represented by following formula (I) and at least one water-insoluble and organic solvent-soluble polymer or copolymer are dispersed in red-sensitive silver halide emulsion layer:

Formula (I)



wherein R_1 , R_2 and R_6 each represent a hydrogen atom or a halogen atom, R_3 represents alkylene, R_4 and R_5 each represent alkyl, alkoxy, a halogen atom, hydroxyl, cyano, acylamino, sulfonamido, sulfonyl or nitro, X represents a hydrogen atom or a coupling-releasable group, ℓ represents an integer of 0 to 18, and n and m each represent an integer of 0 to 2.

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Silver halide color reversal photographic light-sensitive material

The present invention relates to a silver halide color reversal photographic light-sensitive material having excellent spectral absorption characteristics and forming a cyan dye image having fastness to heat or light.

A phenolic or a naphtholic compound is often used as a cyan dye image forming coupler in a silver halide light-sensitive material. Especially in a silver halide color reversal photographic light-sensitive material, a coupler having excellent spectral absorption characteristics, i.e., generating smaller sub peaks in yellow and magenta regions must be used because a film is directly appreciated or because a masking technique as for a color negative photographic light-sensitive material is not used.

Several problems are kept unsolved in stability of a dye image formed by conventionally-used phenolic or naphtholic compound. For example, a dye image formed by a 2-acylaminophenol cyan coupler described in U.S. Patents 2,367,531, 3,369,929, 2,423,730 and 2,801,171 generally has poor heat fastness, and a dye image formed by a 2,5-diacylaminophenol cyan coupler described in U.S. Patents 2,772,162 and 2,895,826 generally has poor light fastness and unsatisfactory heat fastness, resulting in an unsatisfactory performance. A dye image formed by a 1-hydroxy-2-naphthamide cyan coupler is unsatisfactory in fastness to both light and heat.

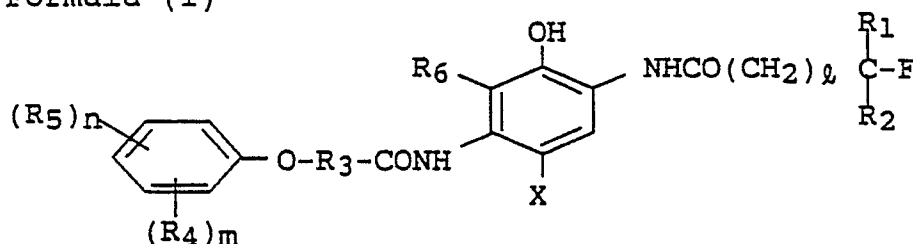
In order to solve the above problems, combinations of a cyan coupler and an ultraviolet absorbent or various decoloration preventing agents have been studied. Examples of the combination are described in JP-A-53-110528, JP-A-56-11453, JP-A-58-208745, JP-A-58-209734, JP-A-58-209735, JP-A-58-211147, JP-A-58-214152, JP-A-58-221844, JP-A-59-46646, JP-A-59-42541, JP-A-59-109055, JP-A-59-124340, and JP-A-60-222853 ("JP-A-" means unexamined published Japanese patent application).

In each of the above examples, however, since either dye image fastness of a coupler or an effect of a combination is unsatisfactory, no satisfactory result is obtained. In addition, many of the above combinations are formed on a reflecting support. However, an influence on especially adhesion properties when the combination is formed on a transparent support is almost not referred to.

It is, therefore, an object of the present invention to provide a silver halide color reversal photographic light-sensitive material which is excellent in spectral absorption characteristics of a cyan dye image forming coupler and is excellent in stability of a cyan dye image and in interlayer adhesion properties.

The above object of the present invention is achieved by a silver halide color reversal photographic light-sensitive material comprising, on a support, at least one red-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one blue-sensitive silver halide emulsion layer, wherein at least one coupler represented by following formula (I) and at least one water-insoluble and organic solvent-soluble polymer or copolymer are dispersed in the red-sensitive silver halide emulsion layer:

Formula (I)



wherein R_1 , R_2 and R_6 each represent a hydrogen atom or a halogen atom, R_3 represents alkylene, R_4 and R_5 each represent alkyl, alkoxy, a halogen atom, hydroxyl, cyano, acylamino, sulfonamido, sulfonyl or nitro, X represents a hydrogen atom or a coupling releasable group, l represents an integer of 0 to 18, and n and m each represent an integer of 0 to 2.

A 2,5-diacylaminophenol cyan coupler used in the present invention represented by formula (I) will be described below.

A halogen atom represented by R_1 and R_2 is fluorine, chlorine or bromine atom and, more preferably, a fluorine atom.

R_3 represents straight or cyclic alkylene having, preferably, 1 to 22 carbon atoms (e.g., methylene,

propylene, propylidene, tridecylidene and cyclohexylidene) or substituted alkylene. Examples of a substituting group on R₃ are alkyl, aryl, a heterocyclic ring, alkoxy (e.g., methoxy and 1-methoxyethoxy), aryloxy (e.g., phenoxy, 2,4-di-tert-amylphenoxy and 2-chlorophenoxy), carboxyl, carbonyl (e.g., acetyl and benzoyl), alkoxycarbonyl (e.g., methoxycarbonyl), aryloxy carbonyl (e.g., phenoxycarbonyl), acyloxy (e.g., acetoxy and benzoyloxy), alkoxysulfonyl (e.g., butoxysulfonyl), aryloxysulfonyl (e.g., phenoxysulfonyl), sulfonyloxy (e.g., methanesulfonyloxy and toluenesulfonyloxy), carbonamido (e.g., acetamido), sulfonamido (e.g., methanesulfonyl), carbamoyl (e.g., ethylcarbamoyl and dimethylcarbamoyl), sulfamoyl (e.g., butylsulfamoyl), sulfamido (e.g., dipropylsulfamoylamido), imido (e.g., succinimido and hydantoinyl), ureido (e.g., phenylureido and dimethylureido), sulfonyl (e.g., methanesulfonyl), hydroxyl, cyano, nitro, a halogen atom and thio (e.g., ethylthio and phenylthio).

An alkyl represented by R₄ or R₅ can be straight-chain, branched or cyclic and preferably has 1 to 15 carbon atoms. Examples of the alkyl are methyl, ethyl, iso-propyl, tert-butyl, cyclohexyl, methoxyethyl and tert-octyl.

An Alkoxy represented by R₄ or R₅ preferably has 1 to 8 carbon atoms. Examples of the alkoxy are methoxy, ethoxy, methoxyethoxy, ethoxymethoxy and hydroxyethoxy.

A halogen atom represented by R₄ or R₅ represents fluorine, chlorine or iodine.

An acylamino, sulfonamido and sulfonyl represented by R₄ or R₅ are represented by -NHCOR₇, -NHSO₂R₇ and -SO₂R₇, respectively. R₇ represents alkyl (which can be straight-chain, branched or cyclic and preferably has 1 to 22 carbon atoms), phenyl or naphthyl. Examples of a substituting group on the alkyl, phenyl or naphthyl are the same as those on an alkylene represented by R₃.

A halogen atom represented by R₆ represents fluorine, chlorine, bromine or iodine.

A coupling releasable group represented by X is an atom group bonded by a nitrogen atom, an oxygen atom, a carbon atom or a sulfur atom or halogen atom. Examples of the coupling releasable group are as follows.

That is, examples of the coupling releasable group are alkoxy, acyloxy, aryloxy, arylthio, heterocyclic thio, alkylthio, sulfonamido, heterocyclic oxy, a nitrogen-containing 5- or 6-membered heterocyclic ring (which contains at least one nitrogen atom as a hetero atom and is bonded to an active position of a coupler by the nitrogen atom, e.g., imidazolyl, triazolyl, 2,4-dioxoimidazolidinyl, 3,5-dioxo-1,2,4-triazolidinyl and pyrazolyl), a benzene-condensed heterocyclic ring (e.g., benzotriazolyl and benzoimidazolyl), arylazo, a chlorine atom and an aliphatic aminomethyl.

The above coupling releasable groups can have the following substituting groups. That is, examples of the substituting group are saturated or unsaturated, cyclic, straight-chain or branched and substituted or non-substituted alkyl having 1 to 32, and preferably, 1 to 10 carbon atoms, aryl having 6 to 10 carbon atoms, a halogen atom, cyano, nitro, nitroso, carboxyl, carbamoyl, sulfo, hydroxyl, amino, sulfamoyl, ureido, alkoxy having 1 to 32, and preferably, 1 to 10 carbon atoms (the number of carbon atoms will be the same hereinafter unless otherwise specified), acylamino, alkoxycarbonyl, alkoxycarbonylamino, alkylsulfonamide, N-alkyl(or N,N-dialkyl)sulfamoyl, N-alkyl(or N,N-dialkyl)carbamoyl, alkanesulfonyl, alkanoyl, alkanoyloxy, alkylthio, aryloxy having 6 to 10 carbon atoms (the number of carbon atoms will be the same hereinafter unless otherwise specified), aryloxy carbonyl, arylsulfonamido, N-arylsulfamoyl, arylsulfonyl, arylthio, arylcarbonyl, N-arylcabamoyl, aryl ureido and aryloxycarbamoyl.

$\bar{t}$ preferably represents an integer of 3 to 13, an integer represented by $\bar{m}$ is preferably 1 or 2 and an integer represented by $\bar{n}$ is preferably 1 or 2.

Examples of a cyan coupler represented by formula (I) used in the present invention will be listed in Table 3 to be presented later, but the cyan coupler is not limited to these examples.

A polymer used in the present invention will be described below.

(A) Vinyl polymer

Examples of a monomer for forming a vinyl polymer of the present invention are acrylic esters such as methylacrylate, ethylacrylate, n-propylacrylate, isopropylacrylate, n-butylacrylate, isobutylacrylate, sec-butylacrylate, tert-butylacrylate, amylacrylate, hexylacrylate, 2-ethylhexylacrylate, octylacrylate, tert-octylacrylate, 2-chloroethylacrylate, 2-bromoethylacrylate, 4-chlorobutylacrylate, cyanoethylacrylate, 2-acetoxyethylacrylate, dimethylaminoethylacrylate, benzylacrylate, methoxybenzylacrylate, 2-chlorocyclohexylacrylate, cyclohexylacrylate, furfurylacrylate, tetrahydrofurfurylacrylate, phenylacrylate, 5-hydroxypentylacrylate, 2,2-dimethyl-3-hydroxypropylacrylate, 2-methoxyethylacrylate, 3-methoxybutylacrylate, 2-ethoxyethylacrylate, 2-iso-propoxyacrylate, 2-butoxyethylacrylate, 2-(2-methoxyethoxy)ethylacrylate, 2-(2-butoxyethoxy) ethylacrylate, ω -methoxypolyethyleneglycolacrylate (number of addition moles $n = 9$), 1-bromo-2-

methoxyethylacrylate and 1,1-dichloro-2-ethoxyethylacrylate. In addition, the following monomer and the like can be used.

Methacrylic esters: examples are methylmethacrylate, ethylmethacrylate, n-propylmethacrylate, isopropylmethacrylate, n-butylmethacrylate, isobutylmethacrylate, sec-butylmethacrylate, tert-butylmethacrylate, amylmethacrylate, hexylmethacrylate, cyclohexylmethacrylate, benzylmethacrylate, chlorobenzylmethacrylate, octylmethacrylate, stearylmethacrylate, sulfopropylmethacrylate, N-ethyl-N-phenylaminoethylmethacrylate, 2-(3-phenylpropyloxy)ethylmethacrylate, dimethylaminophenoxyethylmethacrylate, furfurylmethacrylate, tetrahydrofurfurylmethacrylate, phenylmethacrylate, cresylmethacrylate, naphthylmethacrylate, 2-hydroxyethylmethacrylate, 4-hydroxybutylmethacrylate, triethyleneglycolmonomethacrylate, dipropyleneglycolmonomethacrylate, 2-methoxyethylmethacrylate, 3-methoxybutylmethacrylate, 2-acetoxyethylmethacrylate, 2-acetoacetoxyethylmethacrylate, 2-ethoxyethylmethacrylate, 2-iso-propoxyethylmethacrylate, 2-butoxyethylmethacrylate, 2-(2-methoxyethoxy)ethylmethacrylate, 2-(2-ethoxyethoxy)ethylmethacrylate, 2-(2-butoxyethoxy)ethylmethacrylate, ω -methoxypolyethyleneglycolmethacrylate (number of addition moles $n = 6$), allylmethacrylate and dimethylaminoethylmethacrylate methyl chloride.

Vinyl esters: examples are vinylacetate, vinylpropionate, vinylbutyrate, vinylisobutyrate, vinylcaproate, vinylchloroacetate, vinylmethoxyacetate, vinylphenylacetate, vinylbenzoate and vinylsalicylate;

Acrylamides: examples are acrylamide, methylacrylamide, ethylacrylamide, propylacrylamide, butylacrylamide, tert-butylacrylamide, cyclohexylacrylamide, benzylacrylamide, hydroxymethylacrylamide, methoxyethylacrylamide, dimethylaminoethylacrylamide, phenylacrylamide, dimethylacrylamide, diethylacrylamide, β -cyanoethylacrylamide, N-(2-acetoacetoxyethyl)acrylamide, diacetoneacrylamide and tert-octylacrylamide;

Methacrylamides: examples are methacrylamide, methylmethacrylamide, ethylmethacrylamide, propylmethacrylamide, butylmethacrylamide, tert-butylmethacrylamide, cyclohexylmethacrylamide, benzylmethacrylamide, hydroxymethylmethacrylamide, methoxyethylmethacrylamide, dimethylaminoethylmethacrylamide, phenylmethacrylamide, dimethylmethacrylamide, diethylmethacrylamide, β -cyanoethylmethacrylamide and N-(2-acetoacetoxyethyl)methacrylamide;

Olefins: examples are dicyclopentadiene, ethylene, propylene, 1-butene, 1-pentene, vinyl chloride, vinylidene chloride, isoprene, chloroprene, butadiene, 2,3-dimethylbutadiene; sytynes: examples are styrene, methylstyrene, dimethylstyrene, trimethylstyrene, ethylstyrene, isopropylstyrene, chloromethylstyrene, methoxystyrene, acetoxystyrene, chlorostyrene, dichlorostyrene, bromostyrene and methyl vinyl benzoate;

Vinyl ethers: examples are methylvinyl ether, butylvinyl ether, hexylvinyl ether, methoxyethylvinyl ether and dimethylaminoethylvinyl ether; and butyl crotonate, hexyl crotonate, dimethyl itaconate, dibutyl itaconate, diethyl maleate, dimethyl maleate, dibutyl maleate, diethyl fumarate, dimethyl fumarate, dibutyl fumarate, methylvinylketone, phenylvinylketone, methoxyethylvinylketone, glycidylacrylate, glycidylmethacrylate, N-vinyloxazolidone, N-vinylpyrrolidone, acrylonitrile, methacrylonitrile, methylenemalonitrile and vinylidene.

Monomers (e.g., the above monomers) for a polymer of the present invention are used as comonomers with respect to each other in a combination of two or more types thereof in accordance with various objects (e.g., a solubility improvement). In order to adjust coloring characteristics or solubility, a monomer having the following acid groups can be used as a comonomer as long as a copolymer does not turn to be water-soluble.

Examples of the monomer having acid group are acrylic acid; methacrylic acid; itaconic acid; maleic acid; monoalkyl itaconate, e.g., monomethyl itaconate, monoethyl itaconate and monobutyl itaconate; monoalkyl maleate, e.g., monomethyl maleate, monoethyl maleate and monobutyl maleate; citraconic acid; styrenesulfonic acid; vinylbenzylsulfonic acid; vinylsulfonic acid; acryloyloxyalkylsulfonic acid, e.g., acryloyloxymethylsulfonic acid, acryloyloxyethylsulfonic acid and acryloyloxypropylsulfonic acid; methacryloyloxyalkylsulfonic acid, e.g., methacryloyloxymethylsulfonic acid, methacryloyloxyethylsulfonic acid and methacryloyloxypropylsulfonic acid; acrylamidoalkylsulfonic acid, e.g., 2-acrylamido-2-methylethanesulfonic acid, 2-acrylamido-2-methylpropanesulfonic acid and 2-acrylamido-2-methylbutanesulfonic acid; methacrylamidoalkylsulfonic acid, e.g., 2-methacrylamido-2-methylethanesulfonic acid, 2-methacrylamido-2-methylpropanesulfonic acid and 2-methacrylamido-2-methylbutanesulfonic acid.

The above acids may be salt of an alkali metal (e.g., Na and K) or an ammonium ion.

When a hydrophilic monomer ("hydrophilic monomer" means monomer, exhibits water-solubility in the form of a homopolymer of the monomer) of the above vinyl monomers and the other vinyl monomers used in the present invention is used as a comonomer, the ratio of the hydrophilic monomer in a copolymer is not limited as long as the copolymer does not turn to be water-soluble. The ratio is, however, preferably 40 mol% or less, more preferably, 20 mol% or less and most preferably, 10 mol% or less. If a hydrophilic

comonomer to be copolymerized with a monomer of the present invention has an acid group, in order to assure the image stability as described above, the ratio of the comonomer having an acid group in a copolymer is normally 20 mol% or less and preferably, 10 mol% or less. Most preferably, however, such a comonomer is not contained in a copolymer.

- 5 A monomer of the present invention contained in a polymer is preferably of a methacrylate type, an acrylamide type or a methacrylamide type and more preferably, of an acrylamide type or a methacrylamide type.

10 (B) Polymer prepared by condensation polymerization and polyaddition reaction

Known examples of a polymer prepared by condensation polymerization are polyester of polyhydric alcohol and polybasic acid and polyamide of diamine and dibasic acid and ω -amino- ω -carboxylic acid. A known example of a polymer prepared by a polyaddition reaction is polyurethane of diisocyanate and dihydric alcohol.

15 Effective examples of the polyhydric alcohol are glycols having a structure represented by $\text{HO-R}_1\text{-OH}$ (R_1 represents a hydrocarbon chain, especially an aliphatic hydrocarbon chain having 2 to 12 carbon atoms) and polyalkyleneglycol. Effective examples of polybasic acid are oxalic acid and those having $\text{HOOC-R}_2\text{-COOH}$ (R_2 represents a hydrocarbon chain having 1 to 12 carbon atoms).

20 More specifically, examples of the polyhydric alcohol are ethyleneglycol, diethyleneglycol, triethyleneglycol, 1,2-propyleneglycol, 1,3-propyleneglycol, trimethylolpropane, 1,4-butanediol, isobutylenediol, 1,5-pentanediol, neopentylglycol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, 1,12-dodecanediol, 1,13-tridecanediol, glycerine, diglycerine, triglycerine, 1-methylglycerine, erythritol, mannitol and sorbitol.

25 Examples of the polybasic acid are oxalic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, cork acid, azelaic acid, sebacic acid, nonanedicarboxylic acid, decanedicarboxylic acid, undecanedicarboxylic acid, dodecanedicarboxylic acid, fumaric acid, maleic acid, itaconic acid, citraconic acid, phthalic acid, isophthalic acid, terephthalic acid, tetrachlorophthalic acid, metaconic acid, isopimelic acid, a cyclopentadiene-maleic anhydride adduct and a rosin-maleic anhydride adduct.

30 Examples of the diamine are hydrazine, methylenediamine, ethylenediamine, trimethylenediamine, tetramethylenediamine, hexamethylenediamine, dodecylmethylenediamine, 1,4-diaminocyclohexane, 1,4-diaminomethylcyclohexane, o-aminoaniline, p-aminoaniline, 1,4-diaminomethylbenzene and di(4-aminophenyl) ether.

35 Examples of the ω -amino- ω -carboxylic acid are glycine, β -alanine, 3-aminopropanoic acid, 4-aminobutanoic acid, 5-aminopentanoic acid, 11-aminododecanoic acid, 4-aminobenzoic acid, 4-(2-aminoethyl)benzoic acid and 4-(4-aminophenyl)butanoic acid.

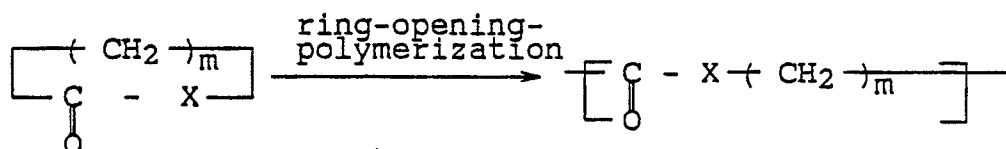
Examples of the diisocyanate are ethylenediisocyanate, hexamethylenediisocyanate, m-phenylenediisocyanate, p-phenylenediisocyanate, p-xylenediisocyanate and 1,5-naphthylidiisocyanate.

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(C) Other polymers

Examples of another polymer are polyester and polyamide prepared by ring-opening-polymerization:

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wherein X represents -O- or -NH- and m represents an integer of 4 to 7. $\{\text{CH}_2\}_m$ can be branched.

Examples of such a monomer are β -propiolactone, β -caprolactone, dimethylpropiolactone, α -pyrrolidone, α -piperidone, ϵ -caprolactam and α -methyl- ϵ -caprolactam.

55 The polymers of the present invention described above can be used in a combination of two or more arbitrary types thereof.

The molecular weight or polymerization degree of a polymer of the present invention does almost not affect an effect of the present invention. As the molecular weight is increased, however, a time required for

dissolving a polymer in an auxiliary organic solvent is prolonged or it becomes difficult to emulsify-disperse a polymer to generate coarse grains, because the solution viscosity is increased. As a result, a coloring property is degraded or a coating property becomes poor. In order to solve these problems, if a large amount of an auxiliary organic solvent were used to decrease the solution viscosity, another process
 5 problem would arise. In view of this, therefore, the viscosity of a polymer is preferably 5,000 cps or less and more preferably, 2,000 or less cps if 30 g of a polymer are dissolved in 100 cc of a used auxiliary organic solvent. The molecular weight of a polymer usable in the present invention is preferably 150,000 or less and more preferably, 100,000 or less.

in the present invention, a water-insoluble polymer means a polymer having a solubility of 3 g or less
 10 and preferably, 1 g or less in 100 g of distilled water.

In the present invention, an organic solvent-soluble polymer means a polymer soluble in an auxiliary organic solvent to be described later.

A ratio of a polymer of the present invention with respect to the auxiliary organic solvent depends on the type of a polymer to be used and widely changes in accordance with the solubility in the auxiliary
 15 organic solvent or polymerization degree or the solubility of a coupler. Generally, an amount of the auxiliary organic solvent is set to obtain a satisfactorily low viscosity at which a solution prepared by dissolving at least a coupler, a high boiling coupler solvent and a polymer in the auxiliary organic solvent can be easily dispersed in water or an aqueous hydrophilic colloid solution. In general, the solution viscosity is increased as the polymerization degree of the polymer is increased. Therefore, it is difficult to unconditionally
 20 determine the ratio of a polymer with respect to the auxiliary organic solvent regardless of the type of a polymer. However, it is preferably from about 1 : 1 to 1 : 50 (weight ratio). A ratio (weight ratio) of a polymer of the present invention with respect to a coupler is preferably from 1 : 20 to 20 : 1 and more preferably, from 1 : 10 to 10 : 1.

Some examples of a polymer used in the present invention are listed below. The present invention is,
 25 however, not limited to these example.

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Example No.	Polymer (The ratio in each parenthesis is a mole ratio)
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- | | |
|----|--|
| 30 | P-1) Polyvinylacetate |
| | P-2) Polymethylmethacrylate |
| | P-3) Polyethylacrylate |
| | P-4) Vinyl acetate-vinyl alcohol copolymer (95 : 5) |
| 35 | P-5) n-butylacrylate-acrylamide copolymer (95 : 5) |
| | P-6) 1,4-butanediol-adipic acid polyester |
| | P-7) Poly(2-tert-butylphenylacrylate) |
| 40 | P-8) n-butylmethacrylate-N-vinyl-2-pyrrolidone copolymer |
| | P-9) Methylmethacrylate-styrene copolymer (90 : 10) |
| | P-10) Vinyl acetate-acrylamide copolymer (85 : 15) |
| 45 | P-11) Vinyl chloride-vinyl acetate copolymer (65 : 35) |

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- P-12) Methylmethacrylate-acrylnitrile copolymer
(65 : 35)
- 5 P-13) Vinylmethylketone-isobutylmethacrylate copolymer
(55 : 45)
- P-14) Diacetoneacrylamide-n-butylacrylate copolymer
(60 : 40)
- 10 P-15) n-butylacrylate-styrenemethacrylate-
diacetoneacrylamide copolymer (70 : 20 : 10)
- P-16) Methylmethacrylate-styrene-vinylsulfonamide
copolymer (70 : 20 : 10)
- P-17) n-butylacrylate-methylmethacrylate-n-
butylmethacrylate copolymer (35 : 35 : 30)
- 15 P-18) n-butylmethacrylate-acrylic acid copolymer
(95 : 5)
- P-19) Benzylmethacrylate-acrylic acid copolymer
(90 : 10)
- 20 P-20) Methylmethacrylate-n-butylmethacrylate copolymer
(65 : 35)
- P-21) Vinyl acetate-vinylpropionate copolymer (75 : 25)
- P-22) n-butylmethacrylate-methylmethacrylate-acrylamide
copolymer (35 : 35 : 30)
- 25 P-23) n-butylmethacrylate-methylmethacrylate-vinyl
chloride copolymer (37 : 36 : 27)
- P-24) Methylmethacrylate-N-vinyl-2-pyrrolidone
copolymer (90 : 10)
- 30 P-25) n-butylmethacrylate-styrene copolymer (70 : 30)
- P-26) Poly-(N-sec-butylacrylamide)
- P-27) Poly-(N-tert-butylacrylamide)
- 35 P-28) Diacetoneacrylamide-methylmethacrylate copolymer
(62 : 38)
- P-29) Poly(N-n-butylacrylamide)
- P-30) tert-butylmethacrylate-methylmethacrylate
copolymer (70 : 30)
- 40 P-31) Poly(N-tert-butylmethacrylamide)
- P-32) Methylmethacrylate-acrylnitrile copolymer
(70 : 30)
- 45 P-33) Methylmethacrylate-styrene copolymer (75 : 25)
- P-34) Methylmethacrylate-hexylmethacrylate copolymer
(70 : 30)
- P-35) Poly(benzylacrylate)
- 50 P-36) Poly(4-butoxycarbonylphenylacrylate)
- P-37) Poly(sec-butylacrylate)
- P-38) Poly[3-chloro-2,2-bis(chloromethyl)propylacrylate]
- P-39) Poly(2-chlorophenylacrylate)
- 55 P-40) Poly(pentachlorophenylacrylate)

- P-41) Poly(cyanoethylacrylate)
P-42) Poly(4-cyano-3-thiabutylacrylate)
5 P-43) Poly(2-ethoxycarbonylphenylacrylate)
P-44) Poly(4-ethoxycarbonylphenylacrylate)
P-45) Poly(3-ethoxypropylacrylate)
10 P-46) Poly(1H,1H,5H-octafluoropentylacrylate)
P-47) Poly(hexylacrylate)
P-48) Poly(isopropylacrylate)
P-49) Poly(2-methoxycarbonylphenylacrylate)
15 P-50) Poly(4-methoxycarbonylphenylacrylate)
P-51) Poly(2-methoxyethylacrylate)
P-52) Poly(3-methoxypropylacrylate)
20 P-53) Poly(3-dimethylaminophenylacrylate)
P-54) Poly(2-methylbutylacrylate)
P-55) Poly(1,3-dimethylbutylacrylate)
P-56) Poly(phenylacrylate)
25 P-57) Poly(propylacrylate)
P-58) Poly(o-tolylacrylate)
P-59) Poly(N,N-dibutylacrylamide)
30 P-60) Poly(iso-octylacrylamide)
P-61) Poly(adamantylmethacrylate)
P-62) Poly(2-bromoethylmethacrylate)
P-63) Poly(2-chloroethylmethacrylate)
35 P-64) Poly(2-cyanomethylphenylmethacrylate)
P-65) Poly(cyclohexylmethacrylate)
P-66) Poly(diethylaminoethylmethacrylate)
40 P-67) Poly(hexadecylmethacrylate)
P-68) Poly(2-hydroxypropylmethacrylate)
P-69) Poly(3,5-dimethyladamantylmethacrylate)
45 P-70) Poly(3,3-dimethylbutylmethacrylate)
P-71) Poly(3,5,5-trimethylhexylmethacrylate)
P-72) Poly(tetradecylmethacrylate)
P-73) Poly(4-carboxyphenylmethacrylamide)
50 P-74) Poly(4-methoxycarbonylphenylmethacrylamide)
P-75) Poly(ethylchloroacrylate)
P-76) Poly(ethylmethacrylate)
55 P-77) Poly(hexylhexyloxycarbonylmethacrylate)

P-78) Poly(isopropylchloroacrylate)

P-79) Hexamethylenediamine-adipic acid polyamide

P-80) Poly(α -pyrrolidone)

- P-81) Poly(ϵ -caprolactam)

P-82) Hexamethylenediisocyanate-1,4-
bytandiolpolyurethane

P-83) p-phenylenediisocyanate-ethyleneglycol
polyurethane

A dispersion consisting of lipophilic fine grains containing a coupler and a polymer of the present invention is prepared as follows.

A polymer of the present invention which is synthesized by a solution polymerization, emulsion polymerization or suspension polymerization and which is not crosslinked, i.e., is a so-called linear polymer, a high boiling coupler solvent and a coupler are completely dissolved in an auxiliary organic solvent. The resultant solution is dispersed in water, preferably, an aqueous hydrophilic colloid solution and more preferably, an aqueous gelatin solution with the aid of a dispersant by an ultrasonic wave, a colloid mill or the like, then the solution is contained in a silver halide emulsion. Alternatively, an aqueous hydrophilic colloid solution such as water or an aqueous gelatin solution can be added in an auxiliary organic solvent containing a dispersing agent such as a surface active agent, a polymer of the present invention, a high boiling coupler solvent and a coupler to prepare an oil-in-water type dispersion upon phase inversion. After the auxiliary organic solvent is removed from the prepared dispersion by distillation, nudel washing or ultrafiltration, the dispersion can be mixed with a photographic emulsion. In this invention, the auxiliary organic solvent means an organic solvent which is effective in emulsify-dispersing and is substantially, finally removed from a light-sensitive material in a drying step upon coating or by the above method. This organic solvent includes a low boiling organic solvent or a solvent having a certain solubility in water and therefore removable by washing with water. Examples of the auxiliary organic solvent are an acetate of a lower alcohol such as ethyl acetate and butyl acetate, ethyl propionate, secondary butyl alcohol, methylethylketone, methylisobutylketone, β -ethoxyethylacetate, methylcellosolveacetate, methylcarbitolacetate, methylcarbitolpropionate and cyclohexane.

The auxiliary organic solvent can be made of at least one of the organic solvents exemplified above, and at least one organic solvent which is completely miscible with water, e.g., methyl alcohol, ethyl alcohol, acetone and tetrahydrofuran.

The above organic solvents can be used in a combination of two or more thereof.

A mean grain size of the lipophilic fine grains prepared as described above is preferably 0.04 to 2 μ and more preferably, 0.06 to 0.4 μ . The grain size of the lipophilic fine grain can be measured by a measuring apparatus such as NANOCIZER available from Calter Co. Ltd. (England).

The lipophilic fine grains of the present invention may contain various photographic hydrophobic substances. Examples of the photographic hydrophobic substance are a colored coupler, a colorless compound forming coupler, a developing agent, a developing agent precursor, a development restrainer precursor, an ultraviolet absorbent, a development accelerator, a gradation adjusting agent such as hydroquinones, a dye, a dye releasing agent, an antioxidant, a fluorescent whicening agent and a decoloration preventing agent. These hydrophobic substances can be used in a combination of two or more types thereof.

In a photographic emulsion layer of the present invention, any of silver bromide, silver iodobromide, silver chlorobromide, silver chloriodobromide, silver chloride and silver chloriodide can be used. Silver iodobromide is preferably used in a high-sensitive light-sensitive material. If silver iodobromide is to be used, the silver iodide content is typically 40 mol% or less, preferably, 20 mol% or less and more preferably, 15 mol% or less.

The above silver halide grains may be regular grains having a regular crystal form such as a cube, an octahedron or a tetradehedron, grains having a regular crystal form such as a sphere, grains having a crystal defect such as a twinning plane or a composite form thereof. Alternatively, a mixture of grains having various crystal forms may be used.

The grains of the above silver halide may be fine grains having a grain size of about 0.1 micron or less,

or large grains having a projected-area diameter of about 10 microns. In addition, an emulsion can be a monodisperse emulsion having a narrow distribution or a polydisperse emulsion having a wide distribution.

In the above emulsion layer, tabular grains having a ratio (aspect ratio) of a circle-equivalent diameter to a grain thickness of 5 or more can be used.

5 A crystal structure of the above emulsion grain can be uniform, can have different halogen compositions in its inner and outer portions or can be a layered structure. These emulsion grains are disclosed in British Patent 1,027,146, U.S. Patents 3,505,068 and 4,444,877 and Japanese Patent Application No. 58-248469. In the grains, a silver halide may be bonded to a silver halide having a different composition by an epitaxial bond or bonded to a compound other than a silver halide such as silver rhodanate or lead oxide. These
10 emulsion grains are disclosed in U.S. Patents 4,094,684, 4,142,900 and 4,459,353, British Patent 2,038,792, U.S. Patents 4,349,622, 4,395,478, 4,433,501, 4,463,087, 3,656,962 and 3,852,067 and JP-A-59-162540.

Although the above emulsions can be of either a surface sensitive emulsion type for forming a latent image mainly on a surface or an internally sensitive emulsion type for forming a latent image inside a grain, or an emulsion type for forming a latent image on a surface and inside a grain they must be negative type
15 emulsions.

A silver halide photographic emulsion which may be used together in the present invention can be prepared by a known method, e.g., a method described in "Emulsion Preparation and Types" of Research Disclosure, Vol. 176, No. 17643 (December, 1978), PP. 22 to 23 or a method described in RD, Vol. 187, No. 18716 (November, 1979), P. 648.

20 A typical example of a monodisperse emulsion to be used in the present invention is an emulsion in which a mean grain size of silver halide grains is about 0.05 micron or more, grain sizes of at least 95 wt% of the grains fall within the range of $\pm 40\%$ of the mean grain size. An emulsion in which a mean grain size of silver halide grains is about 0.05 to 2 microns, and grain sizes of at least 95 wt% or at least 95% (number of grains) of the silver halide grains fall within the range of $\pm 20\%$ of the mean grain size can be
25 used in the present invention. Methods of manufacturing such an emulsion are described in U.S. Patents 3,574,628 and 3,655,394 and British Patent 1,413,748. In addition, mono-disperse emulsions described in JP-A-48-8600, JP-A-51-39027, JP-A-51-83097, JP-A-53-137133, JP-A-54-48521, JP-A-54-99419, JP-A-58-37635 and JP-A-58-49938 can be preferably used in the present invention.

During silver halide grain formation or physical ripening, a cadmium salt, zinc salt, lead salt, thallium
30 salt, iridium salt or its complex salt, a rhodium salt or its complex salt, an iron salt or iron complex salt or the like may be used.

A soluble silver salt is removed from an emulsion before or after physical ripening by nudel washing, flocculation settling or ultrafiltration.

Emulsions for use in this invention are usually subjected to physical ripening and then chemical
35 ripening and spectral sensitization. Additives which are used in such steps are described in Research Disclosures, RD No. 17643 (Dec. 1978) and RD No. 18716 (Nov. 1979) and they are summarized in the following table.

Also, known photographic additives which can be used in this invention are described in the above-described two Research Disclosure publications and they are also summarized in the same table.

40 In the present invention, it is preferred to use various filter dyes such as yellow, magenta and cyan dyes.

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	Additives	RD No.17643	RD No.18716
1.	Chemical sensitizers	page 23	page 648, right column
2.	Sensitivity increasing agents		do
3.	Spectral sensitizers, super sensitizers	pages 23-24	page 648, right column to page 649, right column
4.	Brighteners	page 24	
5.	Antifoggants, stabilizers	pages 24-25	page 649, right column
6.	Light absorbent, filter dye, ultraviolet absorbents	pages 25-26	page 649, right column to page 650, left column
7.	Stain preventing agents	page 25, right column	page 650, left to right columns
8.	Dye image stabilizers	page 25	
9.	Hardening agents	page 26	page 651, left column
10.	Binder	page 26	do
11.	Plasticizers, lubricants	page 27	page 650, right column
12.	Coating aids, surface active agents	pages 26-27	do
13.	Antistatic agents	page 27	do

In this invention, various color couplers in addition to the above cyan coupler can be used in the light-sensitive material. Specific examples of these couplers are described in above-described Research Disclosure, No. 17643, VII-C to VII-G as patent references.

Preferred examples of a yellow coupler are described in U.S. Patents 3,933,501, 4,022,620, 4,326,024, and 4,401,752, JP-B-58-10739 ("JP-B-" means examined Japanese patent application) and British Patents 1,425,020 and 1,476,760.

Examples of a magenta coupler are preferably 5-pyrazolone and pyrazoloazole compounds, and more preferably, compounds described in U.S. Patents 4,310,619 and 4,351,897, European Patent No. 73,636, U.S. Patents 3,061,432 and 3,752,067, Research Disclosure, No. 24220 (June 1984), JP-A-60-33552, Research Disclosure, No. 24230 (June 1984), JP-A-60-43659 and U.S. Patents 4,500,630 and 4,540,654 are most preferable.

Examples of a cyan coupler are a cyan coupler represented by formula (I) of the present invention and 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, and 4,327,173, West German Patent Application (OLS) No. 3,329,729, European Patent No. 121,365A, U.S. Patents 3,446,622, 4,333,999, 4,451,559, and 4,427,767 and European Patent No. 161,626A are most preferable if they are used together with another cyan coupler.

Couplers releasing a photographically useful residue upon coupling are preferably used in the present invention. Preferably examples of DIR couplers, i.e., couplers releasing a development inhibitor are described in the patents cited in the above-described Research Disclosure, No. 17643, VII-F, JP-A-57-151944, JP-A-57-154234, and JP-A-60-184248, and U.S. Patent 4,248,962.

Preferable examples of a coupler imagewise releasing a nucleating agent or a development accelerator upon development are those described in British Patents 2,097,140 and 2,131,188 and JP-A-59-157634 and JP-A-59-170840.

Other examples of a coupler which can be used in the light-sensitive material of the present invention are competing couplers described in, e.g., U.S. Patent 4,130,427; poly-equivalent couplers described in U.S. Patents 4,283,472, 4,338,393, and 4,310,618; DIR redox compound releasing couplers described in, e.g., JP-A-60-185950; and couplers releasing a dye which turns to a colored form after being released described in European Patent No. 173,302A.

The couplers for use in this invention other than that represented by formula (I) can be used in the light-sensitive materials by various known dispersion methods.

In this invention, a preferable layer order is such that red-, green- and blue-sensitive layers from a support or blue-, red- and green-sensitive layers from a support. Each emulsion layer may comprise two or more emulsion layers having different sensitivities. Alternatively, a non-light-sensitive material layer can be interposed between two or more emulsion layers having the same color sensitivity. The red-, green- and blue-sensitive layers normally contain cyan-, magenta- and yellow-dye forming couplers, respectively.

A light-sensitive material according to the present invention preferably has, in addition to the silver

halide emulsion layers, auxiliary layers such as protective layers, interlayers, filter layers, antihalation layers, and back layers.

Supports which can be suitably used in this invention are described in, e.g., above-described RD No. 17643, Page 28 and RD No. 18716, Page 647 (right column) to Page 648 (left column).

5 In processing a color reversal photographic light-sensitive material containing a negative emulsion, as will be described below, after black and white development for forming negative image and before color development, a film is irradiated with light or dipped in a reversal bath containing primary tin ions (Sn^{++}) or the like.

10 Black and White Development → Washing → Reversal Bath (or light irradiation) → Color Development → Conditioning → Bleaching → Fixing → Washing Stabilizing → Drying

Although a color reversal film is typically processed as described above, a pre-bath, a prehardening bath, a neutralizing bath and the like can be used.

15 As a black-and-white developer, known black-and-white developing agents, e.g., dihydroxybenzenes such as hydroquinone, 3-pyrazolidones such as 1-phenyl-3-pyrazolidone, and aminophenols such as N-methyl-p-aminophenol can be used singly or in a combination of two or more thereof.

20 A color developer is an aqueous alkaline solution, preferably containing an aromatic primary amine type developing agent as the main component. Although an aminophenol compound is effective, a p-phenylene diamine compound can be preferably used as the color developing agent. Typical examples of the p-phenylene diamine compound are 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, and 3-methyl-4-amino-N-ethyl-N-β-methoxyethylaniline, and a sulfate, hydrochloride or p-toluenesulfonate of each of the above compounds.

As treating methods and additives for use after conditioning, methods and compounds described in Japanese Patent Application No. 61-276231, PP. 5 to 47 can be used.

25 The present invention will be described in detail below by way of its examples.

EXAMPLES

30

EXAMPLE 1

35 A color light-sensitive material comprising layers having the following compositions was formed on a celluloseacetate film support.

40 Layer 1: A cyan coupler and tricresyl phosphate were mixed at a weight ratio of 3 : 1, and ethyl acetate was added in the resultant solution and dissolved with heat. The resultant solution was emulsified-dispersed in an aqueous gelatin solution containing a surface active agent (soda dodecylbenzenesulfonate), thereby preparing an emulsified dispersion of a cyan coupler. The prepared emulsified dispersion was mixed with a silver iodobromide emulsion (silver iodide = 4 mol%) to prepare a solution in which a molar ratio between silver and the coupler was 7 : 1.

Layer 2: A hardening agent (1,3-vinylsulfonyl-2-propanol) and a surface active agent (Triton X-200) were mixed with an aqueous gelatin solution.

45

Coated samples 101 to 110 were prepared while a cyan coupler and a polymer (1/4 in weight of the coupler) for use in layer 1 were changed as shown in Table 1. A coating amount of the coupler was adjusted to be 1.0 mmol/m². These samples were subjected to red exposure and developed at 38 °C as follows.

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55

Process Steps of Development:		
Step	Time	Temperature
1st Development	6 min.	38 °C
Washing	2 min.	38 °C
Reversal	2 min.	38 °C
Color Development	6 min.	38 °C
Conditioning	2 min.	38 °C
Bleaching	6 min.	38 °C
Fixing	4 min.	38 °C
Washing	4 min.	38 °C
Stabilizing	1 min.	Room Temperature
Drying		

The compositions of processing solutions were as follows.

First Developer:	
Water	700 ml
Pentasodium Nitrilo-N,N,N-trimethylenephosphonate	2 g
Sodium Sulfite	20 g
Hydroquinone Monosulfonate	30 g
Sodium Carbonate (Monohydrate)	30 g
1-phenyl-4-methyl-4-hydroxymethyl-3-pyrazolidone	2 g
Potassium Bromide	2.5 g
Potassium Thiocyanate	1.2 g
Potassium Iodide (0.1% solution)	2 ml
Water to make	1,000 ml

Reversal Solution:	
Water	700 ml
Pentasodium Nitrilo-N,N,N-trimethylenephosphonate	3 g
Stannous Chloride (Dihydrate)	1 g
p-aminophenol	0.1 g
Sodium Hydroxide	8 g
Glacial Acetic Acid	15 ml
Water to make	1,000 ml

Color Developer:	
Water	700 ml
Pentasodium Nitrilo-N,N,N-trimethylenephosphonate	3 g
Sodium Sulfite	7 g
Sodium Tertiary Phosphate (Dodecahydrate)	36 g
Potassium Bromide	1 g
Potassium Iodide (0.1% solution)	90 ml
Sodium Hydroxide	3 g
Citrazinic Acid	1.5 g
N-ethyl-N-(β -methanesulfonamidoethyl)-3-methyl-4-aminoaniline Sulfate	11 g
3,6-dithiaoctane-1,8-diol	1 g
Water to make	1,000 ml
pH	12.0

Conditioning Solution:	
Water	700 m l
Sodium Sulfite	12 g
Sodium Ethylenediaminetetraacetate (Dihydrate)	8 g
Thioglycerin	0.4 m l
Glacial Acetic Acid	3 m l
Water to make	1,000 m l

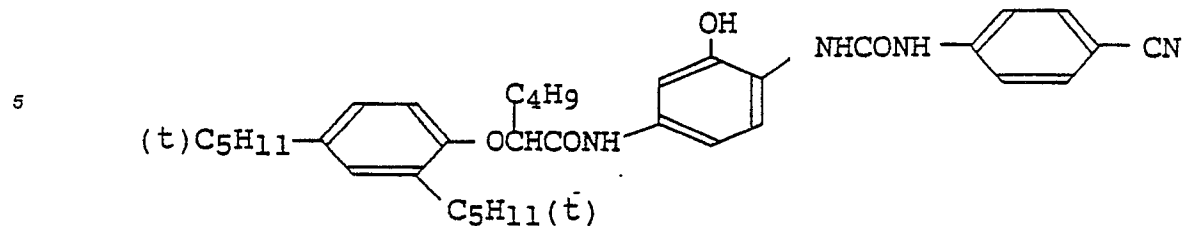
Bleaching Solution:	
Water	800 m l
Sodium ethylenediaminetetraacetate (Dihydrate)	2 g
Ammonium Iron (III) Ethylenediaminetetraacetate (Dihydrate)	120 g
Potassium Bromide	100 g
Water to make	1,000 m l

Fixing Solution:	
Water	800 m l
Ammonium Thiosulfate	80.0 g
Sodium Sulfite	5.0 g
Sodium Bisulfite	5.0 g
Water to make	1,000 m l

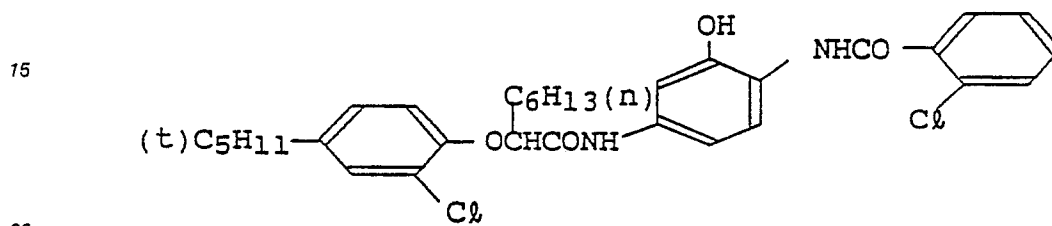
Stabilization Solution:	
Water	800 m l
Formalin (37 wt%)	5.0 m l
Fuji Drywell (surface active agent available from Fuji Photo Film Co., Ltd.)	5.0 m l
Water to make	1,000 m l

Couplers used for comparison

(A)



(B)



Spectral absorption characteristics and dye image stability of the prepared samples were tested as follows.

25

(Spectral absorption characteristics)

The yellow density and the cyan density were measured by use of a spectrophotometer, and their ratio ($D_{450 \text{ nm}}/D_{650 \text{ nm}} \times 100$) was calculated. Similarly, the ratio of magenta density/cyan density ($D_{550 \text{ nm}}/D_{650 \text{ nm}} \times 100$) was calculated.

30

(Image stability test)

35

Dark-fading property

Residual density at a portion having initial density of 1.0 was measured after a sample was reserved in a dark place at 100°C for 144 hours.

40

The above test results are summarized in Table 1 below.

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Table 1

Sample No.	Cyan Coupler	Polymer	Spectral Absorption characteristics		Dark-fading Property	
			$\frac{D_{450nm}}{D_{650nm}} \times 100$	$\frac{D_{550nm}}{D_{650nm}} \times 100$		
101	Comparative Coupler A	-	8.2	45.4	0.92	Comparative Example
102	Comparative Coupler B	-	6.1	46.8	0.85	Comparative Example
103	Exemplified Coupler C-2	-	5.6	22.3	0.86	Comparative Example
104	Exemplified Coupler C-8	-	5.4	26.1	0.78	Comparative Example
105	Exemplified Coupler C-14	-	5.3	23.6	0.81	Comparative Example
106	Comparative Coupler A	P-27	8.4	46.1	0.94	Comparative Example
107	Comparative Coupler B	P-27	6.7	46.9	0.93	Comparative Example
108	Exemplified Coupler C-2	P-27	5.5	22.8	0.94	Present Invention
109	Exemplified Coupler C-8	P-27	5.3	26.2	0.91	Present Invention
110	Exemplified Coupler C-14	P-27	5.3	23.6	0.93	Present Invention

As is apparent from Table 1, in any of samples 108 to 110 according to the present invention, the spectral absorption characteristics of a cyan dye image are good and the stability of the dye image is significantly improved.

EXAMPLE 2

Multilayer color light-sensitive material 201 comprising a plurality of layers having the following compositions was formed on an undercoated triacetylcellulose film support.

Layer 1: Antihalation Layer:

	Black Colloid Silver	0.25 g/m ²
5	Ultraviolet Absorbent U-1	0.1 g/m ²
	Ultraviolet Absorbent U-2	0.1 g/m ²
	High Boiling Organic Solvent Oil-1	0.1 g/m ²
10	Gelatin	1.9 g/m ²

Layer 2: Interlayer-1:

	Compound Cpd D	10 mg/m ²
15	High Boiling Organic Solvent Oil-3	40 mg/m ²
	Gelatin	0.4 g/m ²

Layer 3: Interlayer-2:

20	Surface-fogged Fine Silver Iodobromide Emulsion (mean grain size: 0.06 μ , AgI content: 1 mol%)	
	silver	0.05 g/m ²
	Gelatin	0.4 g/m ²

25 Layer 4: 1st Red-sensitive Emulsion Layer:

30	Silver Iodobromide Emulsion (a 1 : 1 mixture of a monodispersed cubic emulsion having a mean grain size of 0.4 μ and an AgI content of 5 mol% and a monodispersed cubic emulsion having a mean grain size of 0.2 μ and an AgI content of 5 mol%) Spectrally Sensitized with Sensitizing Dyes S-1 and S-2	
	silver	0.4 g/m ²
	Coupler C-1	0.25 g/m ²
35	High Boiling Organic Solvent Oil-2	0.07 cc/m ²
	Gelatin	0.8 g/m ²

Layer 5: 2nd Red-sensitive Emulsion Layer:

5 Silver Iodobromide Emulsion (a monodispersed cubic emulsion having a mean grain size of 0.6 μ and an AgI content of 4 mol%) Spectrally Sensitized with Sensitizing Dyes S-1 and S-2

silver	0.4 g/m ²
Coupler C-1	0.5 g/m ²
10 High Boiling Organic Solvent Oil-2	0.14 cc/m ²
Gelatin	0.8 g/m ²

Layer 6: 3rd Red-sensitive Emulsion Layer:

15 Silver Iodobromide Emulsion (a monodispersed cubic emulsion having a mean grain size of 0.8 μ and an AgI content of 2 mol%) Spectrally Sensitized with Sensitizing Dyes S-1 and S-2

silver	0.4 g/m ²
20 Coupler C-1	1.0 g/m ²
High Boiling Organic Solvent Oil-2	0.28 cc/m ²
25 Gelatin	1.1 g/m ²

Layer 7: Interlayer-3:

Dye D-1	0.02 g/m ²
Gelatin	0.6 g/m ²

Layer 8: Interlayer-4:

30 Surface-fogged Fine Silver Iodobromide (mean grain size: 0.06 μ , AgI content: 1 mol%)

silver	0.05 g/m ²
35 Compound Cpd A	0.2 g/m ²
Gelatin	1.0 g/m ²

Layer 9: 1st Green-sensitive Emulsion Layer:

40 Silver Iodobromide Emulsion (a 1 : 1 mixture of a monodispersed cubic emulsion having a mean grain size of 0.4 μ and an AgI content of 5 mol% and a monodispersed cubic emulsion having a mean grain size of 0.2 μ and an AgI content of 5 mol%) Spectrally Sensitized with Sensitizing Dyes S-3 and S-4

45 silver	0.5 g/m ²
Coupler M-1	0.3 g/m ²
Compound Cpd B	0.03 g/m ²
50 Gelatin	0.5 g/m ²

Layer 10: 2nd Green-sensitive Emulsion Layer:

55 Silver Iodobromide Emulsion (a monodispersed cubic emulsion having a mean grain size of 0.6 μ and an AgI content of 5 mol%) Containing Sensitizing Dyes S-3 and S-4

		silver	0.4 g/m ²
5	Coupler M-1		0.3 g/m ²
	Compound Cpd B		0.03 g/m ²
	Gelatin		0.6 g/m ²
10	Layer 11: 3rd Green-sensitive Emulsion Layer:		
	Silver Iodobromide Emulsion (a tabular emulsion having a mean grain size of 0.8 μ , an aspect ratio of 7, and an AgI content of 2 mol%) Containing Sensitizing Dyes S-3 and S-4		
15		silver	0.5 g/m ²
	Coupler M-1		0.8 g/m ²
	Compound Cpd B		0.08 g/m ²
20	Gelatin		1.0 g/m ²
	Layer 12: Interlayer-5:		
	Dye D-2		0.05 g/m ²
25	Gelatin		0.6 g/m ²
	Layer 13: Yellow Filter Layer:		
	Yellow Colloid Silver		0.1 g/m ²
	Compound Cpd A		0.01 g/m ²
30	Gelatin		1.1 g/m ²
	Layer 14: 1st Blue-sensitive Emulsion Layer:		
35	Silver Iodobromide Emulsion (a 1 : 1 mixture of a monodispersed cubic emulsion having a mean grain size of 0.4 μ and an AgI content of 3 mol% and a monodispersed cubic emulsion having a mean grain size of 0.2 μ and an AgI content 3 mol%) Containing Sensitizing Dyes S-5 and S-6		
40		silver	0.6 g/m ²
	Coupler Y-1		0.6 g/m ²
	Gelatin		0.8 g/m ²
	Layer 15: 2nd Blue-sensitive Emulsion Layer:		
45	Silver Iodobromide Emulsion (a tabular emulsion having a mean grain size of 0.7 μ , an aspect ratio of 7, and an AgI content of 2 mol%) Containing Sensitizing Dyes S-5 and S-6		
50		silver	0.4 g/m ²
	Coupler Y-1		0.3 g/m ²
	Coupler Y-2		0.3 g/m ²
55	Gelatin		0.9 g/m ²

Layer 16: 3rd Blue-sensitive Emulsion Layer:

Silver Iodobromide Emulsion (a tabular emulsion having a mean grain size of 0.7μ , an aspect ratio of 7, and an AgI content of 2 mol%) Containing Sensitizing Dyes S-5 and S-6

silver 0.4 g/m²

Coupler Y-2 0.7 g/m²

Gelatin 1.2 g/m²

Layer 17: 1st Protective Layer:

Ultraviolet Absorbent U-1 0.04 g/m²

Ultraviolet Absorbent U-3 0.03 g/m²

Ultraviolet Absorbent U-4 0.03 g/m²

Ultraviolet Absorbent U-5 0.05 g/m²

Ultraviolet Absorbent U-6 0.05 g/m²

Compound Cpd C 0.8 g/m²

D-3 0.05 g/m²

Gelatin 0.7 g/m²

Layer 18: 2nd Protective Layer:

Surface-fogged Fine Silver Iodobromide Emulsion
(mean grain size: 0.06μ , AgI content: 1 mol%)

silver 0.1 g/m²

Polymethyl Methacrylate Grains
(mean grain size: 1.5μ) 0.1 g/m²

4 : 6 Copolymer of Methyl Methacrylate
and Acrylic Acid
(mean grain size: 1.5μ) 0.1 g/m²

Silicone Oil 0.03 g/m²

Fluorine-containing
Surface Active Agent W-1 3 mg/m²

Gelatin 0.8 g/m²

Gelatin hardening agent H-1 and a surface active agent were added to the layers in addition to the above compositions.

Compounds used for preparing the samples will be listed in Table 4 to be presented later.

The polymers listed in Table 2 were added in layer-4, layer-5, and layer-6 at ratios of 1/4 and 1/1 in weight of the coupler to prepare samples 202 to 207. The prepared samples were treated following the same procedures as in EXAMPLE 1, and then a dye image stability test and an adhesion test were performed. The results are shown in Table 2. In this case, the adhesion test was performed such that the surfaces of the respective samples were cut in cross shapes by a cutter, a Mylar tape was adhered on and removed from each cut portion, and areas of lost images were compared.

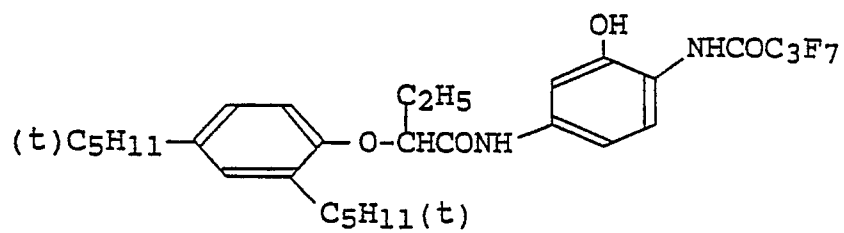
Table 2

Sample		Polymer	Dark-fading Property	Image Area Removed by Tape (Ratio to Entire Image Area)
201	Comparative Example	-	0.84	60 %
202	Present Invention	P-27(1/4 in Weight of Coupler)	0.93	10 %
203	Present Invention	P-2 (1/4 in Weight of Coupler)	0.91	20 %
204	Present Invention	P-33(1/4 in Weight of Coupler)	0.91	10 %
205	Present Invention	P-27(1/1 in Weight of Coupler)	0.95	5 %
206	Present Invention	P-2 (1/1 in Weight of Coupler)	0.92	15 %
207	Present Invention	P-33(1/1 in Weight of Coupler)	0.93	10 %

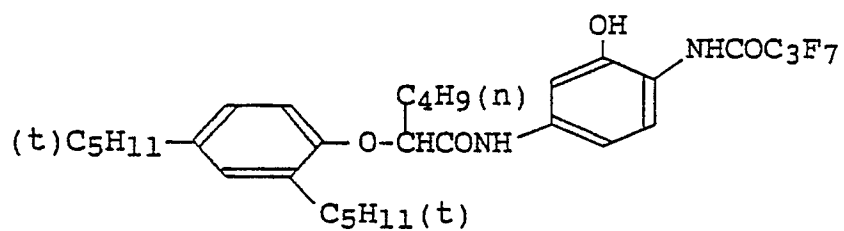
As is apparent from Table 2, in each of the samples containing the various polymers of the present invention, the dye image stability and the adhesion property are significantly improved only if the polymer is used in an amount falling in the preferable range of the invention.

Table 3

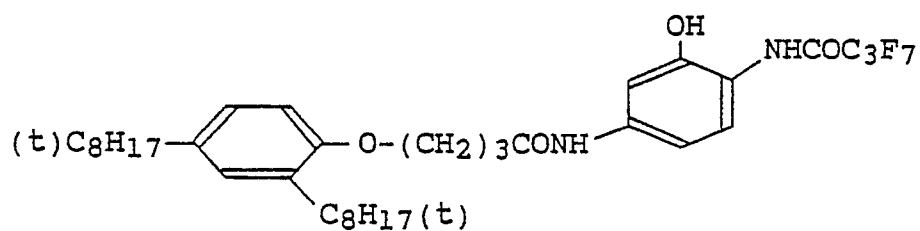
C-1



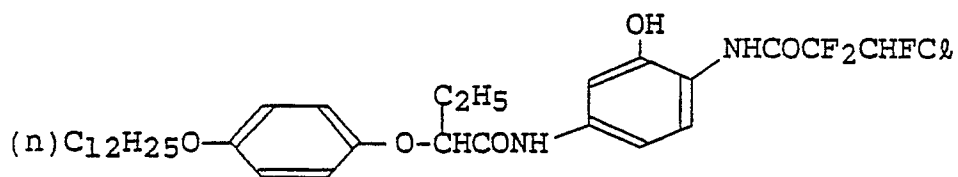
C-2



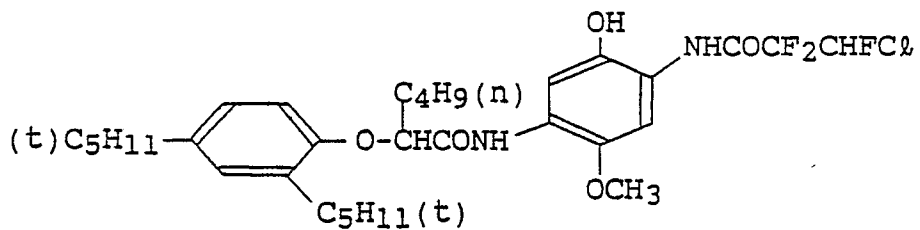
C-3



C-4



C-5



10



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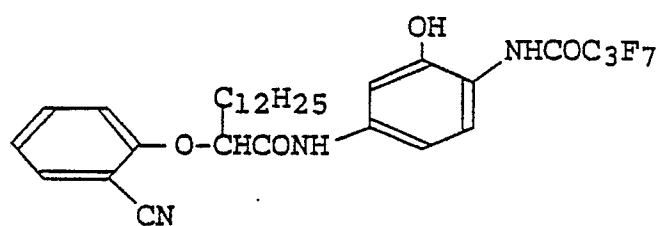


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C-11

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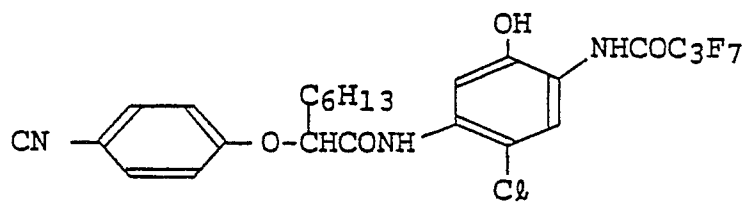
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C-12

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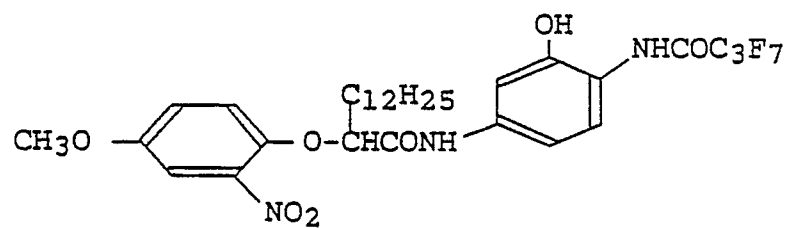
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C-13

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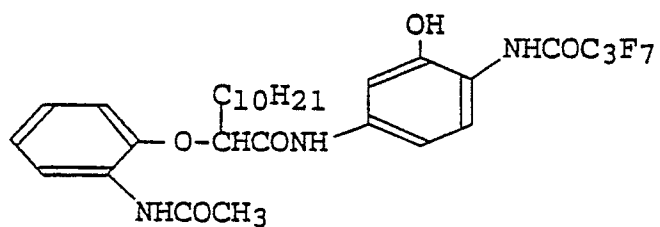
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C-14

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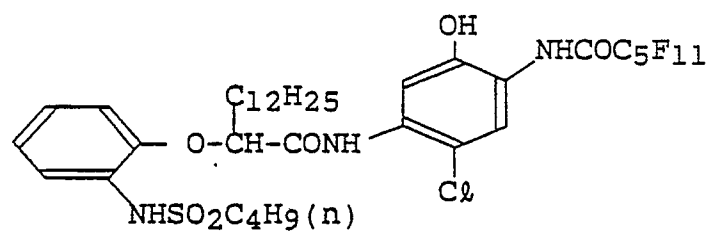
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C-15

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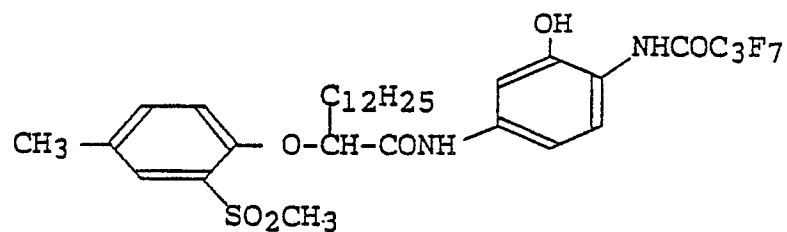


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C-16

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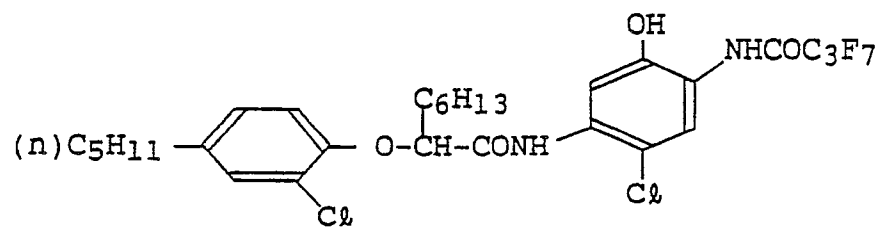
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C-17

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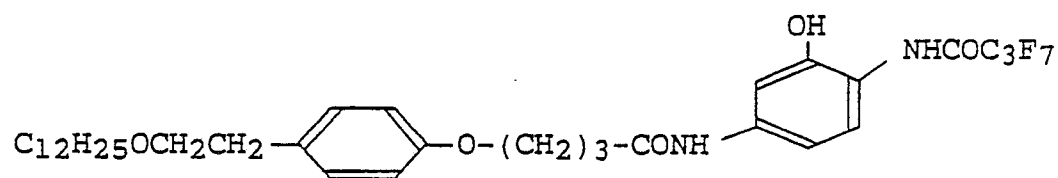
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C-18

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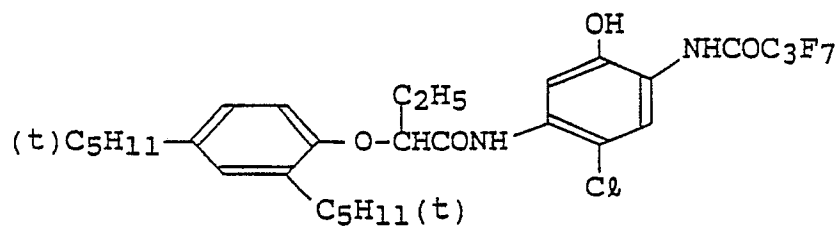
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C-19

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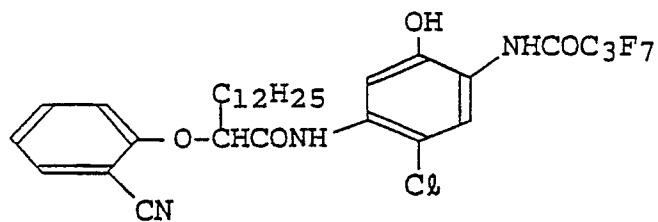
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C-20

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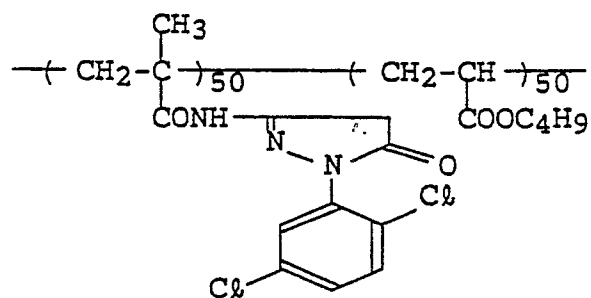
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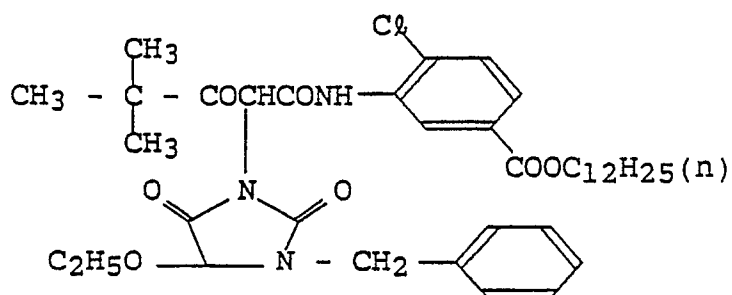
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Table 4

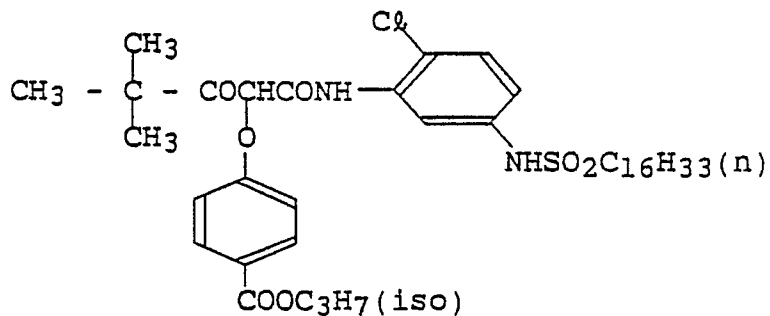
M-1



Y-1

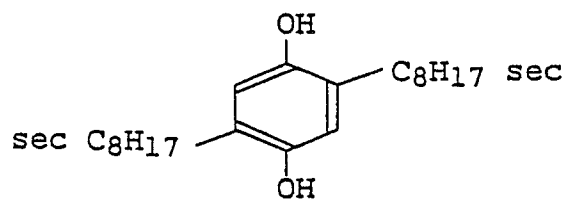


Y-2

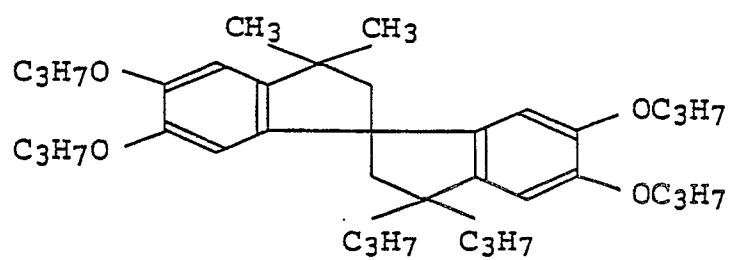


Oil 1 dibutyl phtalate
 Oil 2 tricresyl phosphate
 Oil 3 $\text{C}_2\text{H}_5 \text{ } \text{C}_2\text{H}_5 \text{ } \text{NCOC}_{11}\text{H}_{23}$

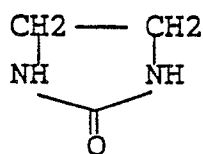
Cpd A



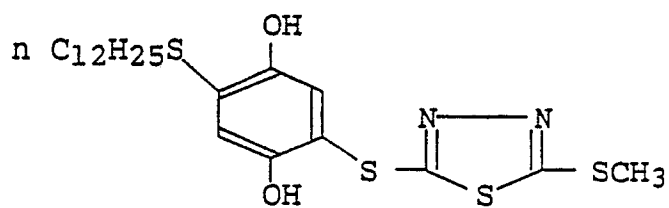
Cpd B



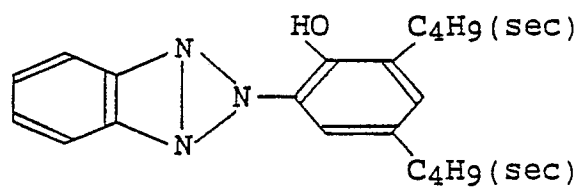
Cpd C



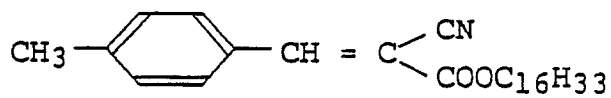
Cpd D



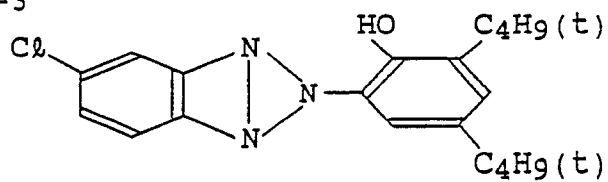
U-1



U-2

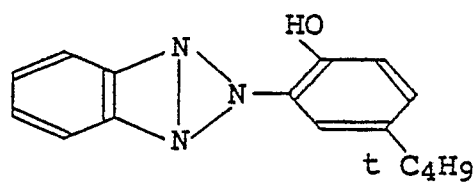


U-3



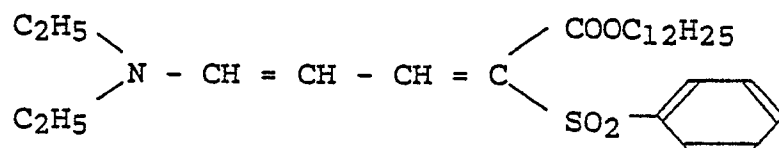
U-4

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U-5

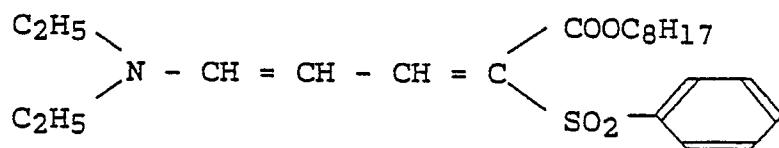
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U-6

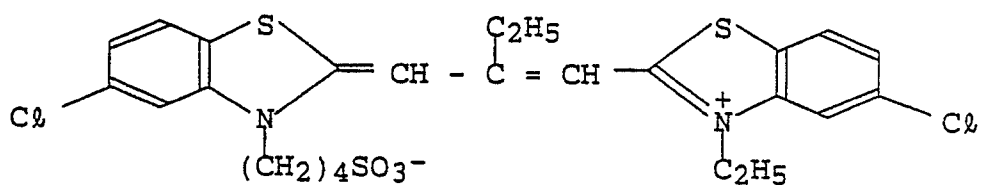
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S-1

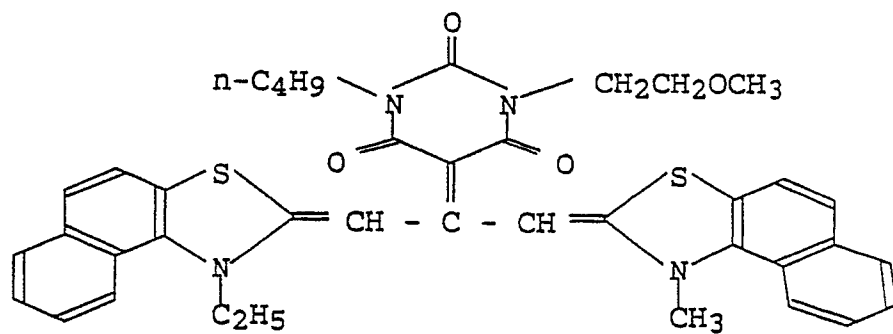
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S-2

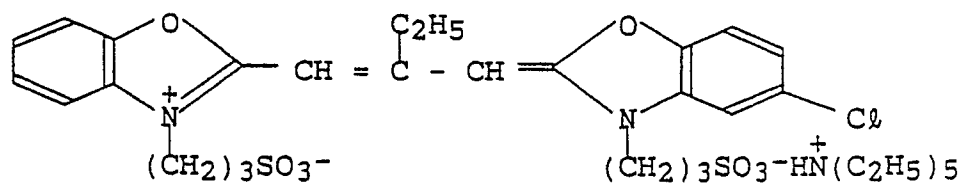
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S-3

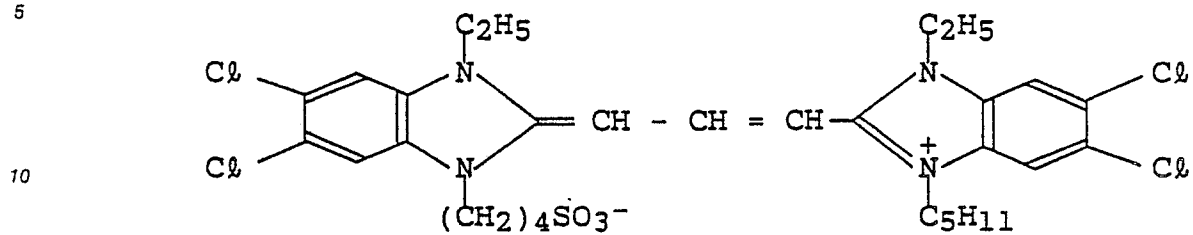
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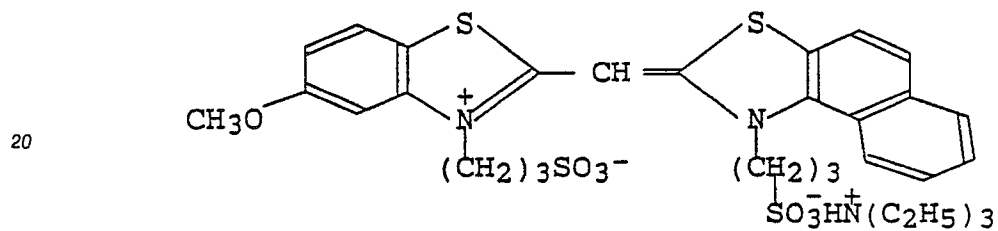
S-4

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S-5

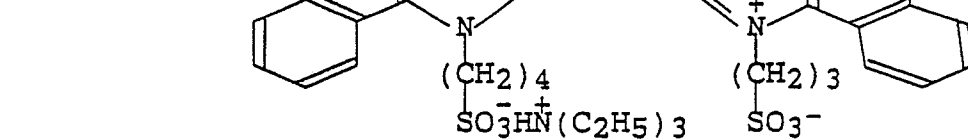
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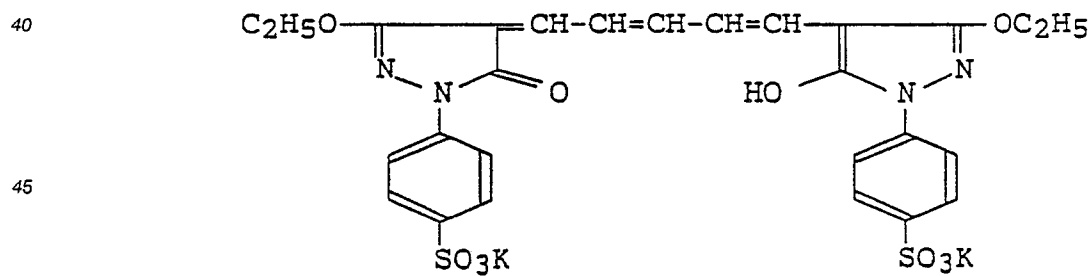
S-6

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D-1

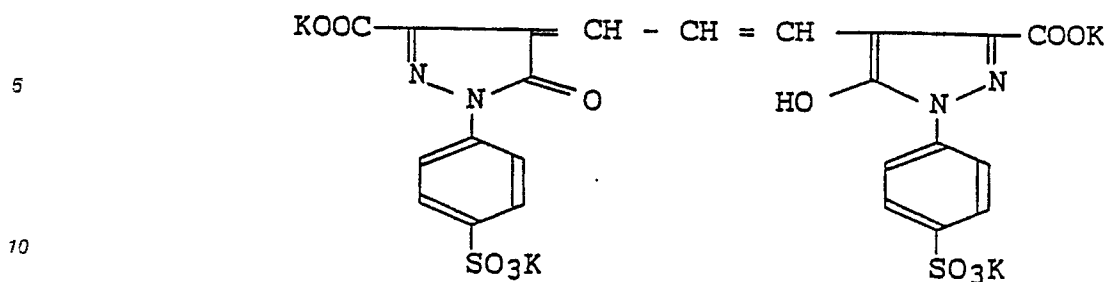
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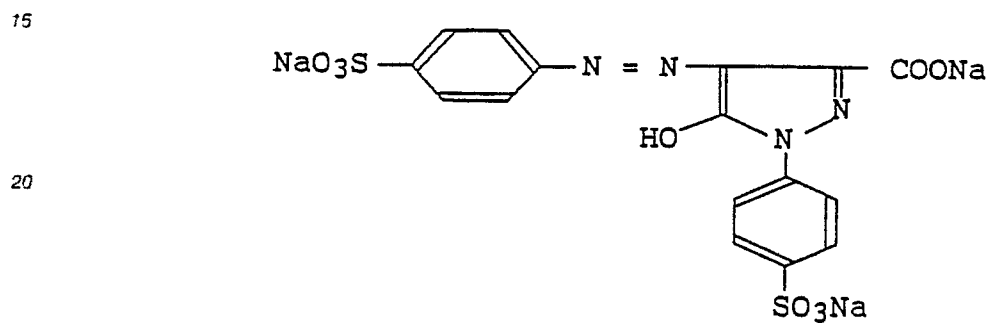
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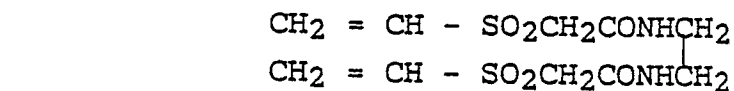
D-2



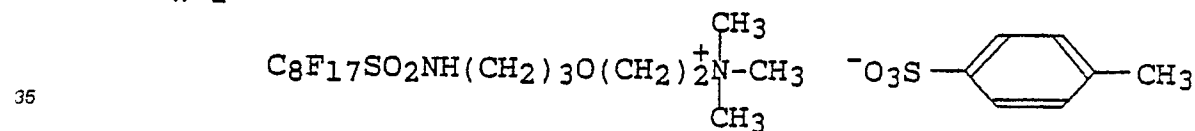
D-3



H-1



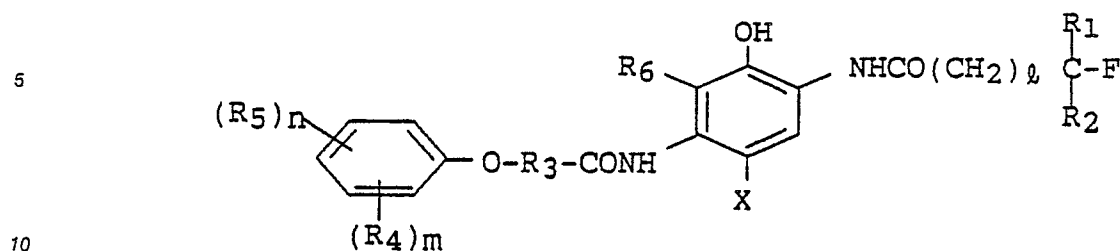
W-1



Claims

1. A silver halide color reversal photographic light-sensitive material comprising, on a support, at least one red-sensitive silver halide emulsion layer, at least one green-sensitive silver halide emulsion layer and at least one blue-sensitive silver halide emulsion layer, wherein at least one coupler represented by following formula (I) and at least one water-insoluble and organic solvent-soluble polymer or copolymer are dispersed in said red-sensitive silver halide emulsion layer:

Formula (I)



wherein R₁, R₂ and R₆ each represent a hydrogen atom or a halogen atom, R₃ represents alkylene, R₄ and R₅ each represent alkyl, alkoxy, a halogen atom, hydroxyl, cyano, acylamino, sulfonamido, sulfonyl or nitro, X represents a hydrogen atom or a coupling releasable group, l represents an integer of 0 to 18, and n and m each represent an integer of 0 to 2.

2. A silver halide color reversal photographic light-sensitive material according to claim 1, characterized in that at least one polymer is selected among (A) vinyl polymer, (B) polymer prepared by condensation or polyaddition reaction, (C) polyester or polyamide prepared by ring opening-polymerization.

3. A silver halide color reversal photographic light-sensitive material according to claim 1, characterized in that viscosity of the solution, in which 30 g of said polymer are dissolved in 100 cc of an organic solvent, is 5,000 cps or less.

4. A silver halide color reversal photographic light-sensitive material according to claim 1, characterized in that a ratio of said polymer to said coupler is from 1 : 20 to 20 : 1 by weight ratio.

5. A silver halide color reversal photographic light-sensitive material according to claim 1, characterized in that a ratio of said polymer to an organic solvent is from 1 : 1 to 1 : 50 by weight ratio.