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(54) **Silver halide photographic light-sensitive material.**

(57) A silver halide photographic material is disclosed which has a high glossiness at the surface thereof. The photographic material comprises a support and one or more photographic component layers provided on the support and at least one of the photographic component layers contains an alkali-processed cattle-bone gelatin without chemical modification which has an isoelectric point not lower than 5.2. The alkali-processed cattle-bone gelatin having specified isoelectric point is preferably contained in a protective layer provided at the position of the photgraphic component layers farthest from the support.

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FIELD OF THE INVENTION

The present invention relates to a silver halide light-sensitive material (hereinafter occasionally referred to as a light-sensitive material), particularly to a silver halide light-sensitive material containing a alkali-processed cattle-bone gelatin having an isoelectric point not less than 5.2 as binder.

Gelatin is widely known as binder of a photographic light-sensitive material. And, in recent years, an alkali-processed or lime-processed cattle-bone gelatin having an isoelectric point of 4.5 to 5.0 is generally used for the reason that it exerts little adverse influence upon photographic properties.

Meanwhile, the demand for high quality image is strong and growing in light-sensitive materials for direct appreciation such as color paper. And images of much higher surface gloss are eagerly desired.

As techniques to raise the surface gloss, Japanese Pat. Exam. Pub. Nos. 43777/1976, 23142/1981 and 28900/1984, for example, disclose the use of acid-processed gelatins as binder for a surface protective layer of a light-sensitive material. Further, Japanese Pat. O.P.I. Pub. Nos. 117534/1986 and 233737/1986 disclose the use of a pigskin lime-processed gelatin.

These techniques can improve the surface gloss, but they are liable to impair coatability in simultaneous coating of multiple photographic component layers on a support, which is popular in the recent coating process of light-sensitive materials and, thereby, they have problems of causing unevenness in density and failure spots attributable to uneven coating and coating failures.

In addition, rapid processing is strongly demanded in the recent photographic industry and, therefore, a light-sensitive material of high silver chloride content having an excellent rapid processability has come widely used in the market of color paper, etc.

There are disclosed techniques to use an acid-processed gelatin having an isoelectric point of 6.0 to 9.5 as binder are disclosed in Japanese Pat. O.P.I. Pub. Nos. 229456/1988, 229457/1988, 304461/1989, and techniques to a gelatin having an isoelectric point not lower than 5.2 in Japanese Pat. O.P.I. Pub. Nos. 188753/1990, 185442/1991. All of them are for the improvement of image preservability, such as stain prevention on the surface of a light-sensitive material as well as minimization of fluctuation in photographic properties and prevention of stains during running of processing. And use of the acid-processed gelatin or the lime-processed pigskin gelatin disclosed therein cannot escape from the defect of deteriorating the coatability either.

Light-sensitive materials are generally stored in a refrigerator and taken out for use in serial order. When a light-sensitive material is touched with fingers and thereby subjected to pressure immediately after it has been taken out of a refrigerator, desensitization marks are formed in the shape of finger prints, hereinafter referred to as finger printing. Moreover, it has been found that a light-sensitive material having a high silver chloride content becomes liable to cause such finger prints and thereby requires much severe control in handling, when it contains an acid-processed gelatin or a pigskin gelatin as binder.

SUMMARY OF THE INVENTION

The present invention is accomplished with the above situation in view. A first object of the invention is to provide a silver halide photographic light-sensitive material capable of forming images with high surface gloss. A second object of the invention is to provide a silver halide photographic light-sensitive material excellent in coatability in the manufacture and less in causing unevenness in density and failure spots attributable to uneven coating and coating failures. A third object of the invention is to provide a silver halide photographic light-sensitive material less in finger printing.

The above objects of the invention are attained by a silver halide photographic light-sensitive material comprising a support having thereon one or more photographic component layers including a silver halide emulsion layer, wherein at least one of said photographic component layers contains a alkali-processed cattle-bone gelatin without chemical modification, which has an isoelectric point not lower than 5.2.

Particularly, the effects of the invention are advantageously brought out when at least the outermost photographic component layer formed at the farthest position from the support contains a alkali-processed cattle-bone gelatin having an isoelectric point not lower than 5.2. It is preferable in the light-sensitive material of the invention that the silver halide emulsion layer contains silver halide grains having a silver chloride content not less than 95 mol%.

DETAILED DESRIPTION OF THE INVENTION

Gelatins used in the photographic industry are usually extracted from cattle-bones, cattle skins or pigskins and classified into two types according to the manufacturing process from collagen: an alkali-processed gelatin which is treated with lime or the like and an acid-processed gelatin which is treated with hydrochloric acid or

the like.

Manufacturing methods and properties of these gelatins are described in Arthur Veis, The Macromolecular Chemistry of Gelatin, Academic Press, pp. 187-217 (1964), T.H. James, The theory of the Photographic Process, 4th edition, Macmillan Publishing Co., p. 55 (1977), Kagaku Shashin Binran Part 1 (Handbook of Scientic Photography, Part 1), Maruzen Ltd., pp. 72-75, Shashin Kogaku no Kiso, Ginen Shashin Hen (Fundamentals of Photographic Engineering, Silver Salt Photographs), Corona Ltd., pp.119-124, etc.

At least one of the photographic component layers constituting the light-sensitive material of the invention contains a alkali-processed cattle-bone gelatin having an isoelectric point not lower than 5.2, hereinafter referred to as the gelatin of the invention. The isoelectric point of the gelatin of the invention is preferably 5.2 to 6.0, especially 5.2 to 5.5.

The term "isoelectric point" used here is expressed as a hydrogen ion concentration at which the algebraic sum of electric charges in an aqueous solution of an amphoteric electrolyte becomes zero, and it is determined according to the PAGI Method issued by The Joint Coucil for the Method of Testing Photographic Gelatin, 6th edition, Oct., 1987. To be concrete, it is determined by passing a 1% aqueous solution of gelatin through a mixed bed column of cationic and anionic ion exchange resins and then measuring the pH.

The isoelectric point of the gelatin of the invention is for a gelatin before it is subjected to hardening; that is, it is determined by the isoelectric point of a gelatin to be added to a coating solution to form a photographic component layer.

The gelatin of the invention is used in an amount of desirably not less than 50 wt% and more desirably not less than 80 wt% of the total amount of gelatin contained in the photographic component layer to which it is added and, in the most desirable embodiment of the invention, the addition amount is substantially 100 wt% of the total amount of gelatin. When the gelatin of the invention is used as a blend with other types of gelatins, the isoelectric point after blending is preferably not less than 5.2.

In the invention, it is preferable that the difference between the pH of a coating solution to form a photographic component layer containing the gelatin of the invention and the isoelectric point of the gelatin of the invention be not less than 0.3.

The jelly strength according to the PAGI Method of the gelatin of the invention is preferably not less than 250 g, especially not less than 270 g.

The calcium content according to the PAGI Method of the gelatin of the invention is preferably not more than 1000 ppm, especially not more than 500 ppm. As the usual procedure to minimize the calcium content in a gelatin, treatment with an ion exchange resin column is preferred.

Further, the gelatin of the invention may be subjected to oxidizing treatment by use of hydrogen peroxide or the like to minimize its photographic activity.

The molecular weight of the gelatin according to the invention is not limitative, but it is preferably 10,000 to 200,000 in terms of average molecular weight.

The gelatin of the invention, which is an alkali-processed cattle-bone gelatin, is obtained by the steps of removing calcium phosphate contained in cattle-bones with hydrochloric acid and the liming the resulting ossein under controlled conditions. The gelatin of the invention, which is made from cattle-bone by alkali-processing method and has an ioselectric point not less than 5.2, is available from the market. Although an alkali-treated gelatin having an isoelectric point not less than 5.2 can be obtained by subjecting the usual cattle-bone alkali-processed gelatin having an isoelectric point not more than 5.0 to chemical modification such as amidation or esterification so as to decrease its carboxyl group content and, thereby, raising its isoelectric point, such a chemically treated gelatin cannot exhibit the effects of the invention sufficiently.

The light-sensitive material of the invention may be either one having a single photographic component layer or one having a plurality of photographic component layers. When it is composed of a plurality of photographic component layers, the effect of the invention can be advantageously brought out by incorporating the gelatin of the invention in the surface protective layer formed at the farthest position from the support.

Besides the foregoing gelatin, the light-sensitive material of the invention may use, as binder or protective colloid, other hydrophilic colloids such as gelatin derivatives, graft polymers obtained by grafting a polymer on gelatin, proteins, sugar derivatives, cellulose derivatives and synthetic hydrophilic homo- or copolymers.

Preferably, the sum of the amounts of hydrophilic colloids including gelatin coated on the support of the light-sensitive material of the invention is not more than 8.0 g/m^2.

The gelatin contained in the light-sensitive material of the invention is hardened by a hardener.

Usable hardeners are not particulaly limited, and there can be used conventional photographic hardeners such carboxyl-activating type and polymer type hardeners including aldehyde type, active vinyl type, active halogen type, epoxy type, ethleneimine type, methanesulfonate type, carbodiimide type, isooxazole type and carbamoyl pyridinium salts. But, particularly preferred are vinylsulfone type hardeners, for example, compounds H-1 to H-24 described on pages 13-14 of Japanese Pat. O.P.I. Pub. No. 188753/1990, chlorotriazine

type hardeners (for example, compounds II-1 to II-13 and III-1 to III-10 described on pages 20-21 of Japanese Pat. O.P.I. Pub. No. 216340/1989) and carboxyl-activating type hardeners including those described in Japanese Pat. O.P.I. Pub. Nos. 82237/1990, 129245/1989.

The swelling rate of the light-sensitive material of the invention is preferably 1.5 to 4.0 and especially 2.0 to 3.0. The swelling rate is defined as the ratio of thickness of a hydrophilic colloidal layer in a processing solution/thickness of a dry hydrophilic colloidal layer.

When the light-sensitive material of the invention is a color photographic light-sensitive material, it takes a multilayer coating structure comprising a plurality of silver halide emulsion layers each having a different light-sensitive wavelength region and a plurality of nonlight-sensitive hydrophilic colloidal layers. In coating such plural layers, there are preferably used the slide hopper method and the curtain coating method, each of which can coat plural layers simultaneously. The slide hopper method is particularly preferred for its capability of providing stable coating; techniques to practice this method can be seen, for example, in Japanese Pat. O.P.I. Pub. Nos. 115214/1977, 1350/1979, 108566/1981, 126648/1985, 83066/1990 and 216139/1990.

In the constant pursuit of a faster coating speed for high productivity and reduced cost in the manufacture of light-sensitive materials, the effect of the invention is demonstrated more clearly, as the coating speed for a light-sensitive material becomes higher. That is, the coating speed for the light-sensitive material of the invention is 100 m/min or more, preferably 150 m/min or more.

Silver halide used in the silver halide emulsion layer of the invention may be any of silver chloride, silver bromide, silver iodide, silver chlorobromide, silver iodobromide and silver chloroiodide.

Silver halide grains favorably used in the invention are those having a silver chloride content not less than 95 mol%; desirably, the silver bromide content is not more than 5 mol%, and the silver iodide content is not more than 0.5 mol%. More desirable are silver chlorobromide grains of which silver bromide content is 0.1 to 2 mol%. These silver halide grains may be used singly or in combination with other types of grains different in composition; these may also be used together with silver halide grains having a silver chloride content not more than 95 mol%. In a silver halide emulsion layer containing silver halide grains having a silver chloride content not less than 95 mol%, the ratio of silver halide grains having a silcer chloride content not less than 95 mol% to the total silver halide grains contained therein is not less than 60 wt%, preferably not less than 80 wt%. The composition of such silver halide grains may be uniform from the inner portion to the outer portion of the grains, or may be different from the inner portion to the outer portion. In the latter case, the composition may change continuously or discontinuously.

The size of the silver halide grains are not particularly limited, but it is preferably 0.2 to 1.6 μm, especially 0.25 to 1.2 μm in view of rapid processability, sinsitivity and other photographic properties.

The size distribution of the silver halide grains may be polydispersed or monodispersed, but monodipersed grains having a coefficient of variation not more than 0.22, especially not more than 0.15, are preferred. The term "coefficient of variation" used here is a coefficient indicating the extent of grain size distribution, which is defined by the following equation:

$$\text{Coefficient of Variation} = \text{Standard Deviation of Grain Size/Average Grain Size}$$

The silver halide grains used in the invention may be prepared by any of the acid method, the neutral method and the ammoniacal method. These grains may be grown in one step, or in two steps of forming seed grains and growing the resulting seed grains. The method for making seed grains and that for growing seed grains may be the same or different. The reaction between a soluble silver salt and a soluble halide may be carried out by any of the single-jet method, the reverse-jet method, the double-jet method and combinations thereof, but the double-jet method is preferred. Further, there may also be used the pAg-controlled double-jet method disclosed in Japanese Pat. O.P.I. Pub. No. 48521/1979 as a modification of the double-jet method.

When necessary, silver halide solvents such as thioether and imidazole may be used. Further, mercapto-group-containing compounds, nitrogen-containing heterocyclic compounds and compounds such as sensitizing dyes may be added in the process of silver halide grain formation or after the formation of silver halide grains.

The form of the silver halide grains is not limitative. One preferred example is a cube having {100} faces as crystal face. Other useful examples include those octahedrons, tetradecahedrons and dodecahedrons which can be synthesized according to the methods described, for example, in U.S. Pat. Nos. 4,183,756, 4,225,666, Japanese Pat. O.P.I. Pub. No. 26589/1980, Japanese Pat. Exam. Pub. No. 42737/1980 and J. Photgr. Sci., Vol. 21, p. 39 (1973). There may also be employed grains having twin planes. The silver halide grains used in the invention may comprise those having a single form, or those in which grains of different forms are mixed.

In the invention, metal ions may be incorporated in the inner portion or outer portion of silver halide grains while these grains are being formed and/or being grown, by use of cadmium salts, zinc salts, lead salts, thallium salts, iridium salts and complex salts thereof, rhodium salts and complex salts thereof, iron salts and complex

salt thereof. Further, there may be provided reduced sensity specks in the inner portion or outer portion of grains by placing these grains in a reducing environment.

Emulsions containing silver halide grains may be subjected to desalting after completion of grain formation to remove useless soluble salts, or these soluble salts may be left unremoved.

In the invention, silver halide grains used in the emulsion may be those in which latent images are formed mainly on the surface, or those in which latent images are formed mainly in the inner portion; but, preferred are those in which latent images are formed mainly on the surface.

In the invention, the emulsion is chemically sensitized by the usual method. There can be used, singly or in combination, sulfur sensitization which uses sulfur-containing compounds reactive to silver ions, or active gelatin; selenium sensitization which uses selenium compounds; reducing sensitization which uses reducing substances; and noble metal sensitization which uses noble metals such as gold and other noble metals.

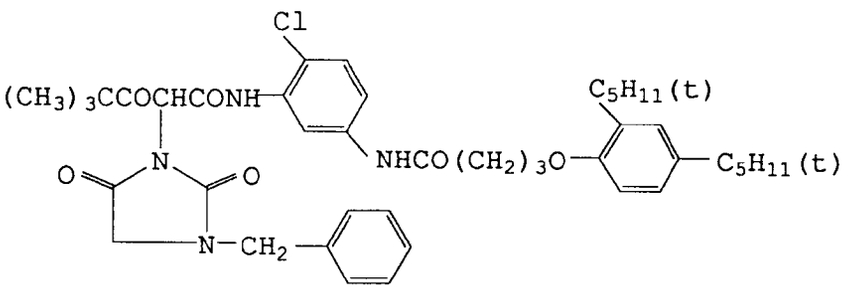
Further, the emulsion may be spectrally sensitized to a desired wavelength region by use of sensitizing dyes. Usable sensitizing dyes are cyanine dyes, merocyanine dyes, conjugated cyanine dyes, conjugated merocyanine dyes, holopolar cyanine dyes, hemicyanine dyes, styryl dyes and hemioxanol dyes. Typical examples thereof include the compounds exemplified on pages 76-82 of Japanese Pat. Appl. No. 76278/1990 by denotations of BS-1 to BS-9, GS-1 to GS-5, RS-1 to RS-8, and IRS-1 to IRS-10. And examples of the supersensitizer usable in conjunction whith these sensitizing dyes include exemplified compounds SS-1 to SS-9 on pages 84-85 of Japanese Pat. Appl. No. 76278/1990.

Dye forming couplers used in the light-sensitive material of the invention are usually selected so as to form, in an emulsion layer, a dye capable of absorbing the light to which the emulsion layer is spectrally sensitive. Therefore, yellow dye forming couplers are used in a blue-sensitive emulsion layer, magenta dye forming couplers in a green-sensitive emulsion layer, and cyan dye forming couplers in a red-sensitive emulsion layer. However, other combinations may be used in the manufacture of the light-sensitive material when a specific requirement arises.

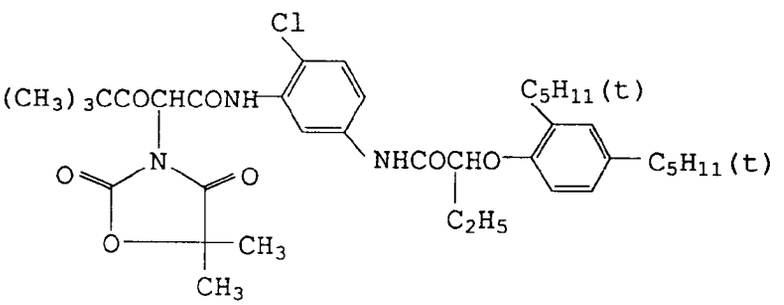
In the invention, acyl acetanilide type couplers are used as yellow dye forming couplers. Amoung them, benzoyl acetanilide type and pivaloyl acetanilide type couplers are advantageous.

Following are preferred examples of the yellow couplers:

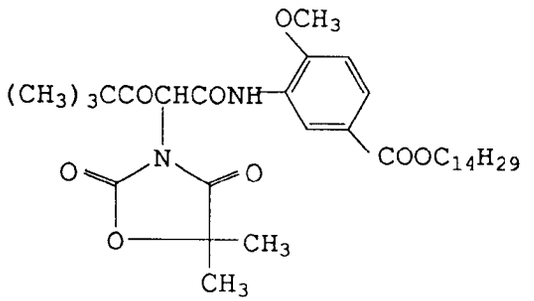
YC-1



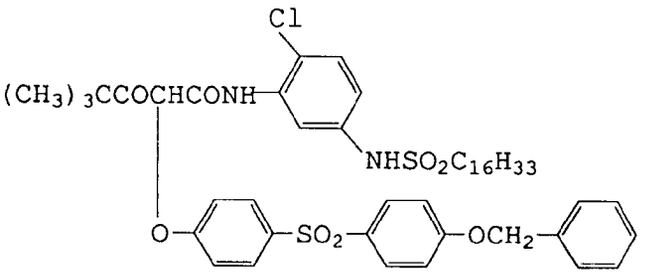
YC-2



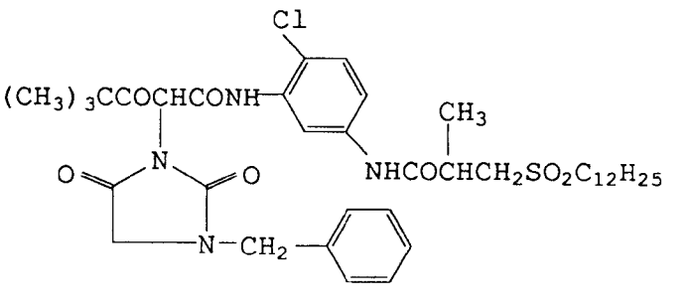
YC-3



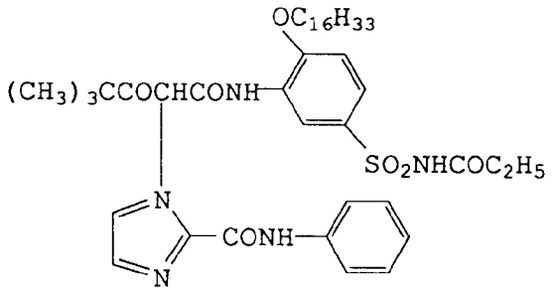
YC-4



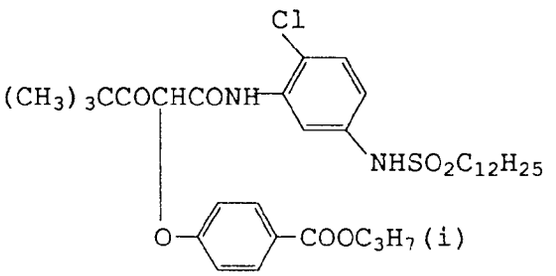
YC-5



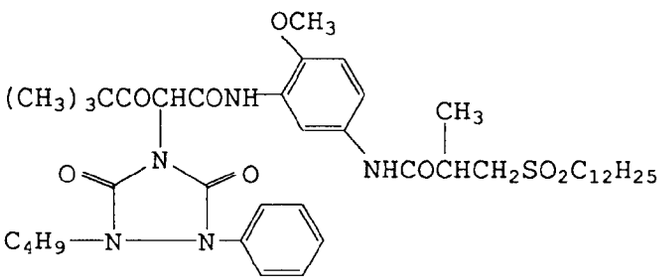
YC-6



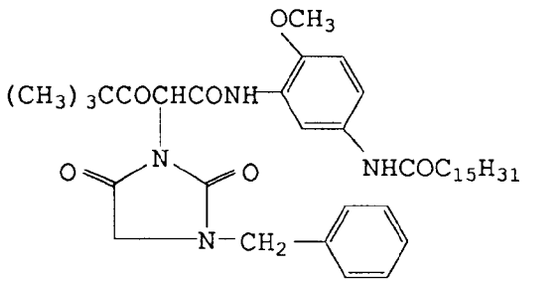
YC-7



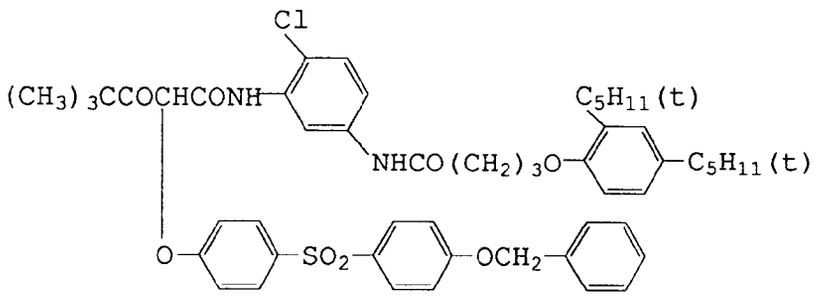
YC-8



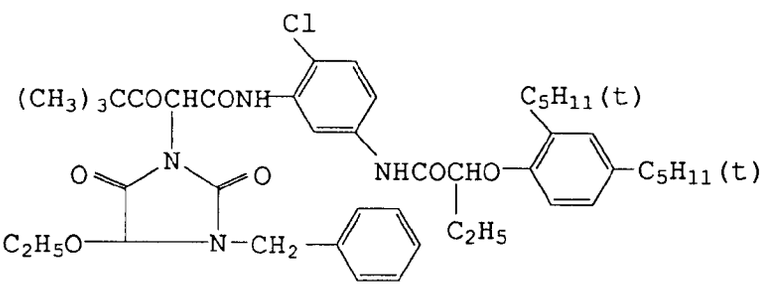
YC-9



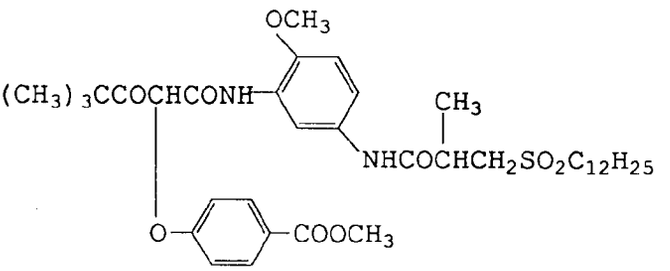
YC-10



YC-11



YC-12

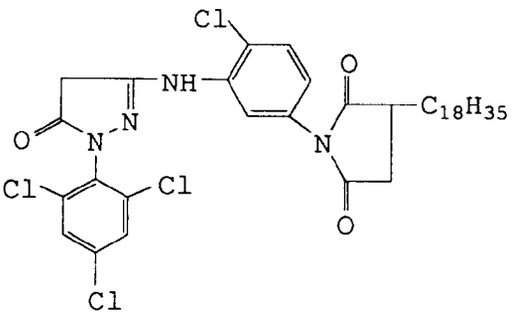


Other usable yellow couplers include exemplified compounds Y-1 to Y-146 on pages 7-16 of Japanese Pat. O.P.I. Pub. No. 85631/1988, exemplified compounds Y-1 to Y-98 on pages 6-10 of Japanese Pat. O.P.I. Pub. No. 97951/1988, exemplified compounds Y-1 to Y-24 on pages 18-20 of Japanese Pat. O.P.I. Pub. No. 156748/1989, exemplified compounds I-1 to I-50 on pages 4-7 of Japanese Pat. O.P.I. Pub. No. 298943/1990, and exemplified compounds Y-1 to Y-48 on pages 114-120 of Japanese Pat. O.P.I. Pub. No. 215272/1987.

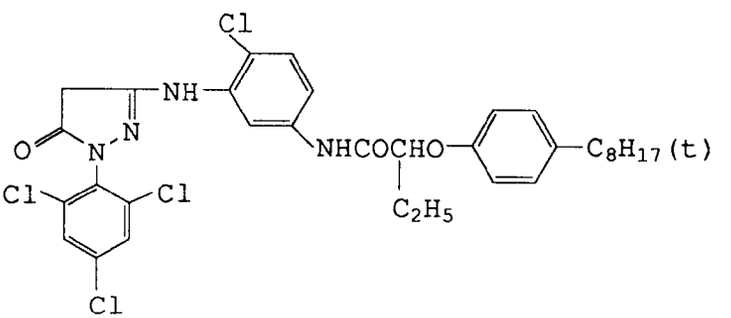
In the invention, conventional couplers of 5-pyrazolone type, pyrazoloazole type and pyrazolobenzimidazole type can be used as magenta dye forming couplers.

The following are preferred examples of the magenta couplers:

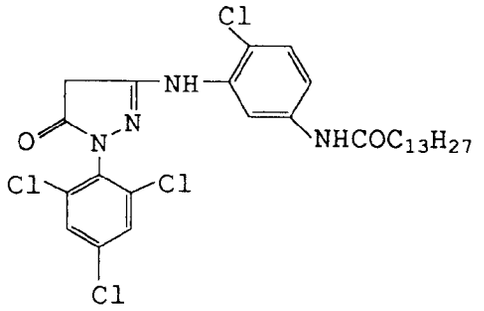
MC-1



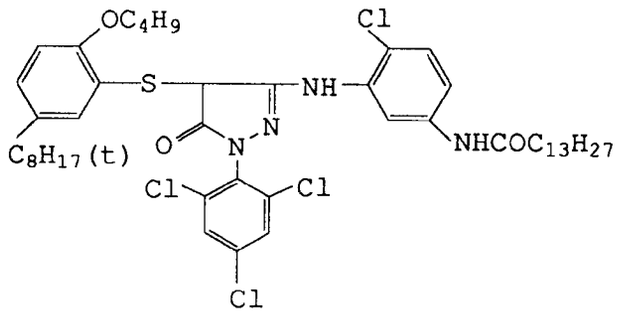
MC-2



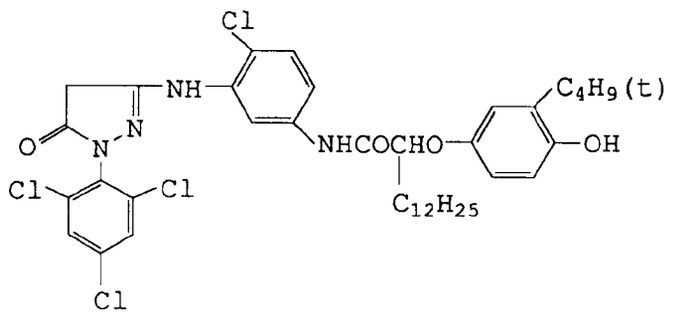
MC-3



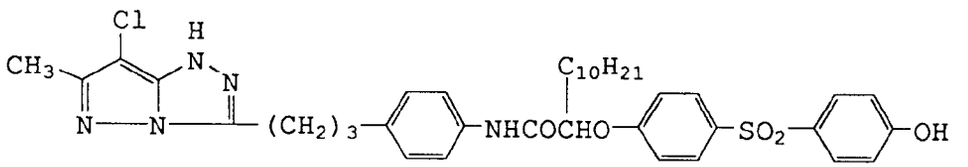
MC-4



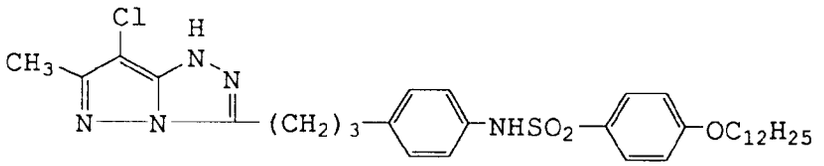
MC-5



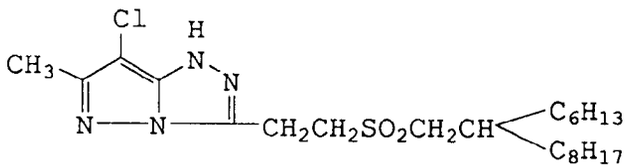
MC-6



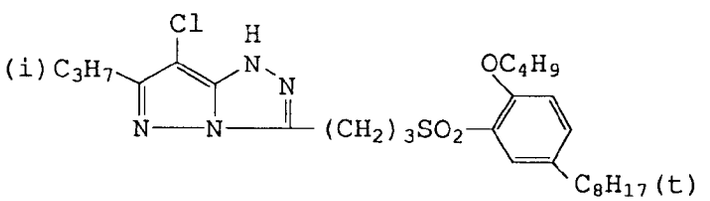
MC-7



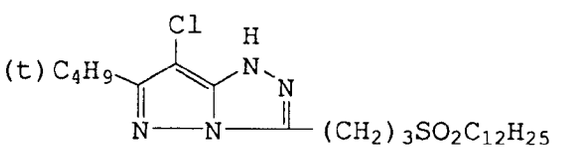
MC-8



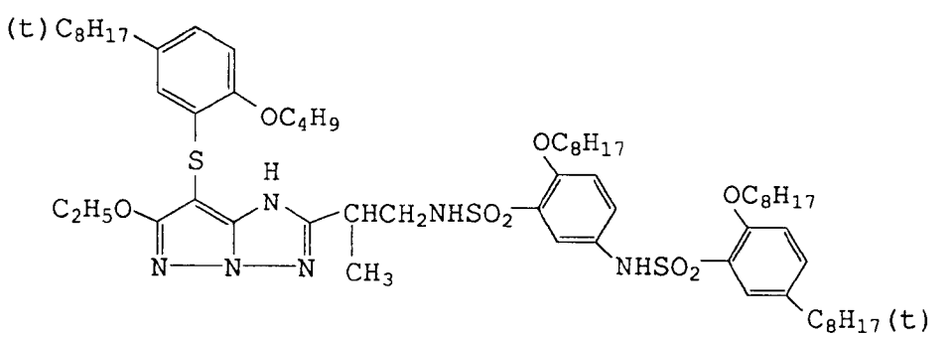
MC-9



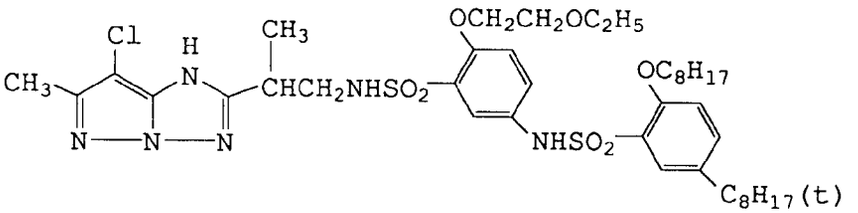
MC-10



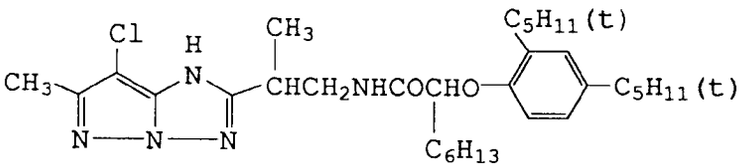
MC-11



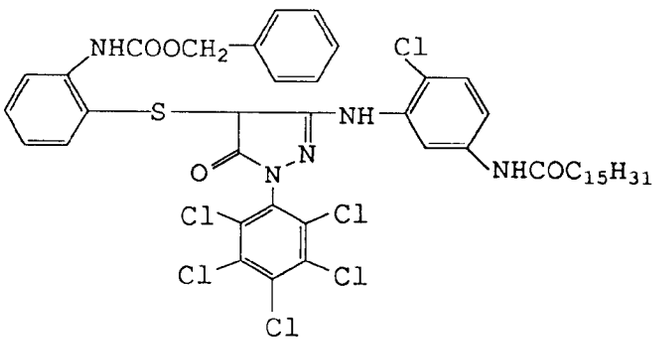
MC-12



MC-13



MC-14



Usable magenta couplers other than the above include exemplified compounds 1 to 223 on pages 18-32 of Japanese Pat. O.P.I. Pub. No. 166339/1987, exemplified compounds M-1 to M-29 on pages 5-6 of Japanese Pat. O.P.I. Pub. No. 100048/1990, exemplified compounds M-1 to M-30 on pages 9-12 of Japanese Pat. O.P.I. Pub. No. 214155/1991, and exemplified compounds M-1 to M-47 on pages 104-114 of Japanese Pat. O.P.I. Pub. No 215272/1987.

In the invention, naphthol type and phenol type couplers are preferably used as cyan dye forming couplers.

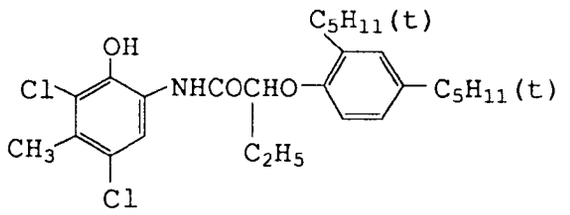
When the light-sensitive material of the invention is for direct appreciation such as color paper, there are preferably employed, in respect of fastness of dye images and color reproduction, those 2,5-diacylaminophenol type cyan couplers which are disclosed in U.S. Pat. No. 2,895,826, Japanese Pat. O.P.I. Pub. Nos. 112038/1975, 109630/1978, 163537/1980, 96656/1988, and those phenol type cyan couplers having an alkyl group of two or more carbon atoms at the 5-position which are disclosed in U.S. Pat. Nos. 3,772,002 and 4,443,536.

Besides these naphthol type and phenol type cyan couplers, useful cyan couplers, for having a high color reproducibility, image preservability and recoloring property, include the imidazole type cyan couplers disclosed in Japanese Pat. O.P.I. Pub. Nos. 156748/1989, 174153/1991, 196039/1991; the pyrazoloazole type and pyrozoloazine type cyan couplers disclosed in Japanese Pat. O.P.I. Pub. Nos. 136854/1990, 196039/1991; the hydroxypyridine type and hydroxyazine type cyan couplers disclosed in Japanese Pat. O.P.I. Pub. Nos.

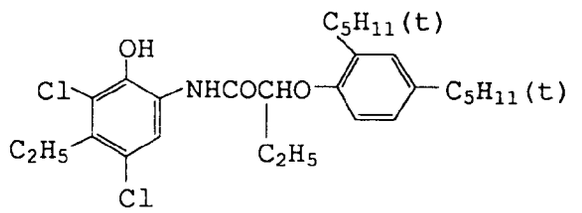
103848/1991, 103849/1991; and the aminopyridine type cyan couplers disclosed in Japanese Pat. O.P.I. Pub. No. 206450.

The following are typical examples of the cyan couplers useful in the invention:

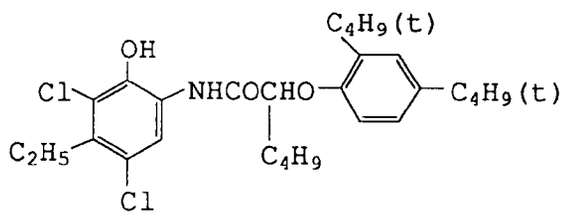
CC-1



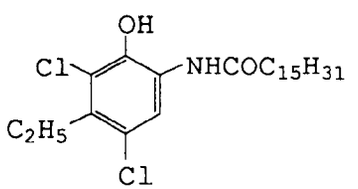
CC-2



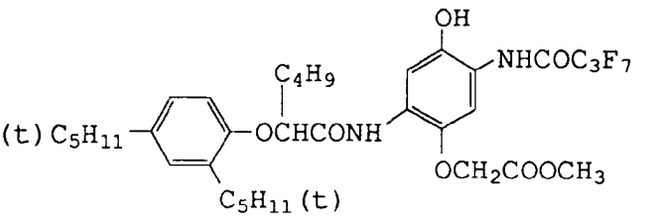
CC-3



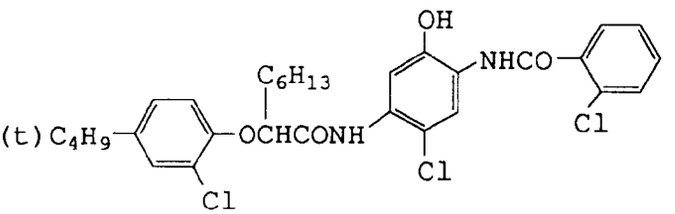
CC-4



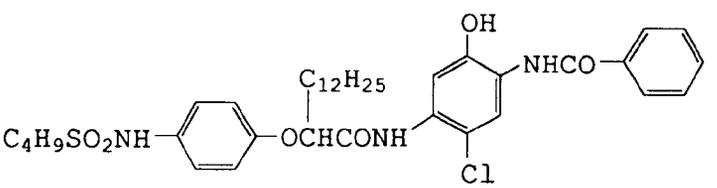
CC-5



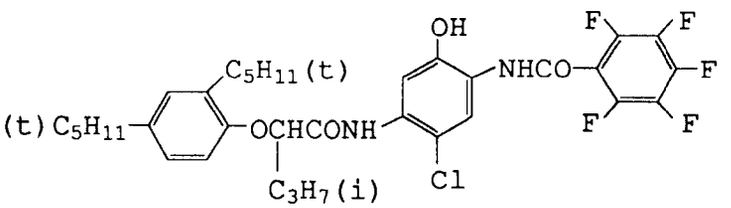
CC-6



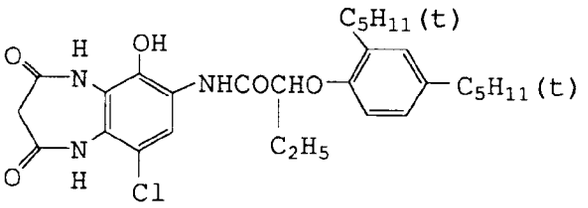
CC-7



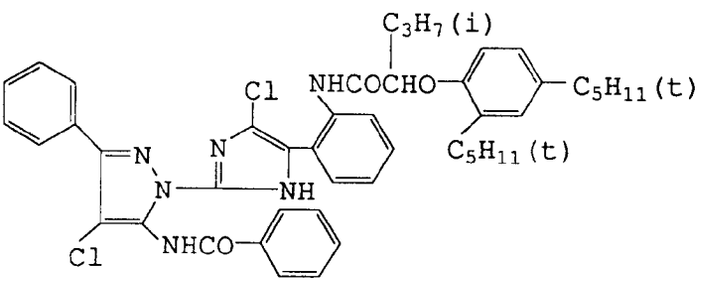
CC-8



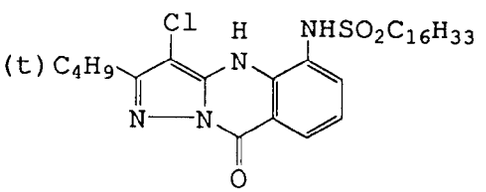
CC-9



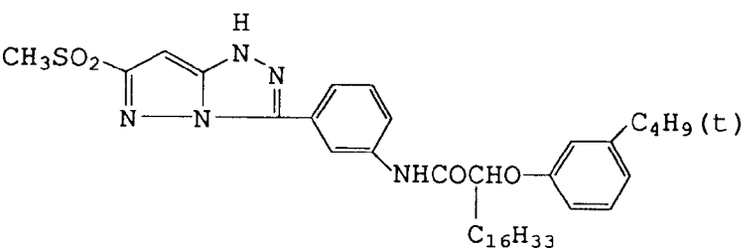
CC-10



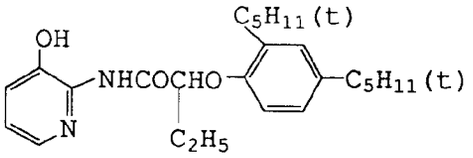
CC-11



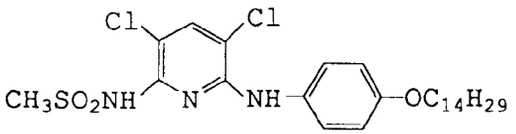
CC-12



CC-13



CC-14



In addition to the foregoing compounds, there can be used, as phenol type cyan couplers, exemplified compounds C-1 to C-31 on pages 4-6 of Japanese Pat. O.P.I. Pub. No. 96656/1988, exemplified compounds III-1 to III-31 and IV-1 to IV-20 on pages 10-13 of Japanese Pat. O.P.I. Pub. No. 196048/1989, exemplified compounds C-1 to C-22 on pages 9-11 of Japanese Pat. O.P.I. Pub. No. 109549/1991 and exemplified compounds C-1 to C-42 on pages 99-103 of Japanese Pat. O.P.I. Pub. No. 215272/1987, and as cyan couplers other than the phenol type, exemplified compounds A-1 to A-13, B-1 to B-16, C-1 to C-8 and D-1 to D-8 on pages 5 to 7 of Japanese Pat. O.P.I. Pub. No. 136854/1990, exemplified compounds (1) to (69) on pages 7-13 of Japanese Pat. O.P.I. Pub. No. 103848/1991 and exemplified compounds C-1 to C-103, D-1 to D-31 on pages 18-20 of Japanese Pat. O.P.I. Pub. No. 196039/1991.

In the invention, hydrophobic compounds such as the dye forming couplers are incorporated into a desired hydrophilic colloidal layer generally by steps of dissolving them in a high boiling solvent or water-insoluble high-molecular compound each having a boiling point about 150°C and more or, if necessary, jointly using a low boiling solvent and/or a water-soluble organic solvent, and then dispersing the resulting solution in a hydrophlic binder, such as gelatin, with the aid of a surfactant using a dispersing means such as a stirrer, homogenizer, colloid mill, flow jet mixer or supersonic dispersing device.

The high boiling solvent used in the invention includes esters such as phthalates and phosphates, organic acid amides, ketones and hydrocarbon compounds. Examples thereof include exemplified compounds A-1 to A-120 on pages 4-7, exemplified compounds II-1 to II-29 on pages 8-9 and exemplified compounds H-1 to H-22 on pages 14-15 of Japanese Pat. O.P.I. Pub. No. 196048/1989; exemplified compounds S-1 to S-69 on pages 3-7 of Japanese Pat. O.P.I. Pub. No. 209446/1989; and exemplified compounds I-1 to I-95 on pages 10-12 of Japanese Pat. O.P.I. Pub. No. 253943/1988.

The water-insoluble high-molecular compound used for dispersing couplers includes (1) vinylpolymers and copolymers (2) condensation polymers between a polyvalent alcohol and a polybasic acid, (3) polyesters obtained by ring-opening polymerization, (4) other polymers including polycarbonates, polyurethanes and polyamides.

The number average molecular weight of these polymers is not particularly limited, but it is preferably not more than 200,000, especially 5,000 to 100,000.

Preferred examples of the polymer are shown below. For copolymers, monomer weight ratios are given in parentheses.

(PO-1) Poly(N-t-butylacrylamide)
(PO-2) N-t-butylacrylamide-methyl methacrylate copolymer (60:40)
(PO-3) Poly(butyl methacrylate)
(PO-4) Methyl methacrylate-styrene copolymer (90:10)
(PO-5) N-t-butylacrylamide-2-methoxyethyl acrylate copolymer (55:45)
(PO-6) ω -Methoxy polyethylene glycol acrylate (moles added: 9) -N-t-butylacrylamide copolymer (25:75)

In addition to the above compounds, suitable polymers include exemplified compounds P-1 to P-200 on pages 10-15 of Japanese Pat. O.P.I. Pub. No. 537/1989.

The light-sensitive material of the invention may optionally use antifoggants, image stabilizers, hardeners, plasticizers, anti-irradiation dyes, polymer latices, UV absorbents, formaline scavengers, development accel-

erators, development retarders, optical whitening agents, matting agents, lubricants, antistatic agents and surfactants. These compounds are described, for example, in Japanese Pat. O.P.I. Pub. Nos. 215272/1987, 46436/1988. The light-sensitive material of the invention forms images when subjected to color development according to the usual method.

EXAMPLES

Example 1

A multilayer color light-sensitive material, sample 101, was prepared by forming the component layers shown in Tables 1 and 2 simultaneously, using a slide hopper, on the titanium-oxide-bearing side of a paper support laminated with polyethylene on one side and with titanium-oxide-containing polyethylene on the other side. Coating solutions used were prepared as follows:

Coating solution for first layer

There was dissolved in 60 ml of ethyl acetate a mixture of 26.7 g of yellow coupler (YC-5), 10.0 g of dye image stabilizer (ST-1), 6.67 g of dye image stabilizer (ST-2), 0.67 g of antistain agent (HQ-1) and 6.67 g of high boiling solvent (DNP). The solution was dispersed in 220 ml of 10% aqueous gelatin solution containing 7 ml of 20% surfactant (SU-2) by use of a supersonic homogenizer. Then, the dispersion was mixed with a bule-sensitive silver halide emulsion containing 10 g of silver prepared under the following conditions, followed by addition of anti-irradiation dye (AI-3) to give a coating solution for the 1st layer.

Subsequently, coating solutions for the 2nd to 7th layers were prepared likewise.

Further, hardener (HH-1) was added to the 2nd and 4th layers, and hardener (HH-2) in the 7th layer. As coating aids, surfactants (SU-1) and (SU-3) were used to adjust the surface tension. The pH of each coating solution was adjusted to 5.9 with a dilute sulfuric acid or a dilute aqueous potassium hydroxide.

Table 1

Layer	Component	Amount (g/m^2)
7th layer	gelatin A	1.00
6th layer (UV absorbing layer)	gelatin A	0.60
	UV absorbent (UV-1)	0.10
	UV absorbent (UV-2)	0.04
	UV absorbent (UV-3)	0.16
	antistain agent (HQ-1)	0.01
	DNP	0.20
	PVP	0.03
	anti-irradiation dye (AI-2)	0.02
5th layer (red-sensitive layer)	gelatin A	1.40
	red-sensitive silver chlorobromide emulsion (EmC), in silver equivalent	0.24
	cyan coupler (CC-1)	0.17
	cyan coupler (CC-8)	0.25
	dye image stabilizer (ST-1)	0.20
	antistain agent (HQ-1)	0.01
	HBS-1	0.20
	DOP	0.20
4th layer (UV absorbing layer)	gelatin A	1.40
	UV absorbent (UV-1)	0.28
	UV absorbent (UV-2)	0.09
	UV absorbent (UV-3)	0.38
	antistain agent (HQ-1)	0.03
	DNP	0.40

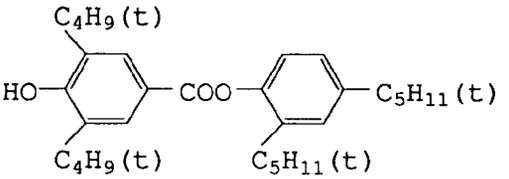
Table 2

Layer	Component	Amount (g/m^2)
3rd layer (green-sensitive layer)	gelatin A	1.40
	green-sensitive silver chlorobromide emulsion (EmB) in silver equivalent	0.27
	magenta coupler (MC-2)	0.45
	dye image stabilizer (ST-3)	0.15
	dye image stabilizer (ST-4)	0.15
	DNP	0.20
	anti-irradiation dye (AI-1)	0.01
2nd layer (intermediate layer)	gelatin A	1.20
	antistain agent (HQ-2)	0.12
	DIDP	0.15
1st layer (blue-sensitive layer)	gelatin A	1.20
	blue-sensitive silver chlorobromide emulsion (EmA) in silver equivalent	0.30
	yellow coupler (YC-5)	0.80
	dye image stabilizer (ST-1)	0.30
	dye image stabilizer (ST-2)	0.20
	antistain agent (HQ-1)	0.02
	anti-irradiation dye (AI-3)	0.01
	DNP	0.20
support	polyethylene laminated paper	

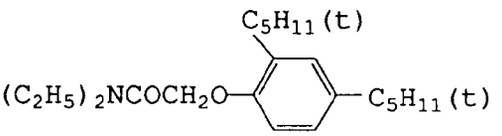
The additives used in respective layers were as follows:

HH-1: Tetrakis(vinylsulfonylmethyl)methane
HH-2: Sodium 2,4-dichloro-6-hydroxy-s-triazine
SU-1: Sodium tri-i-propylnaphthalenesulfonate
SU-2: Sodium di(2-ethylhexyl)sulfosuccinate
SU-3: Sodium di(2,2,3,3,4,4,5,5,-octafluoropentyl) -sulfosuccinate
ST-3: 1,4-Dibutoxy-2,5-di-t-butylbenzene
DOP: Dioctyl phthalate
DNP: Dinonyl phthalate
DIDP: Di-i-decyl phthalate
PVP: Polyvinyl pyrrolidone
HBS-1: 1-Dodecyl-4-(p-toluenesulfonamido)benzene
HQ-1: 2,5-Di-t-octylhydroquinone
HQ-2: 2-Hexadecyl-5-methylhydroquinone

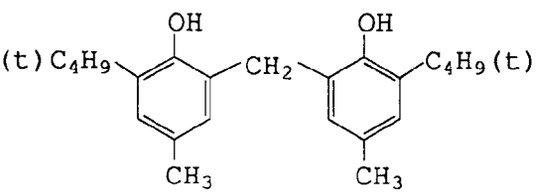
ST-1



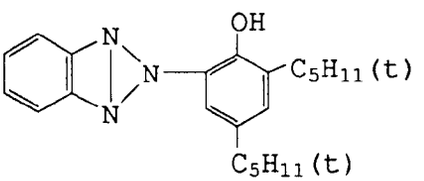
ST-2



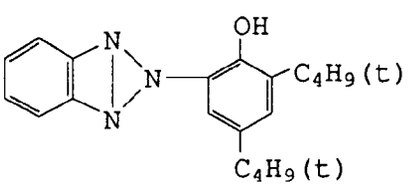
ST-4



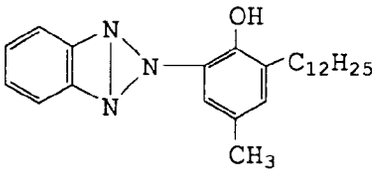
UV-1



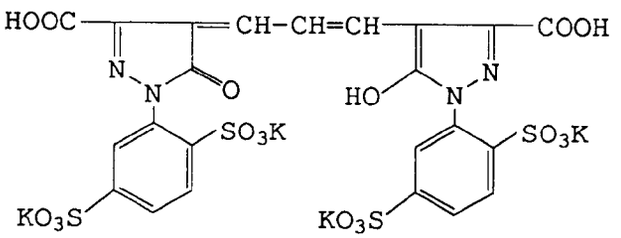
UV-2



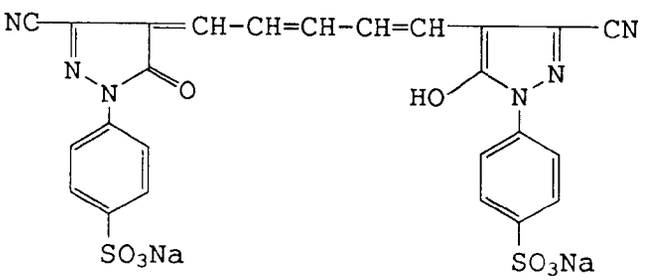
UV-3



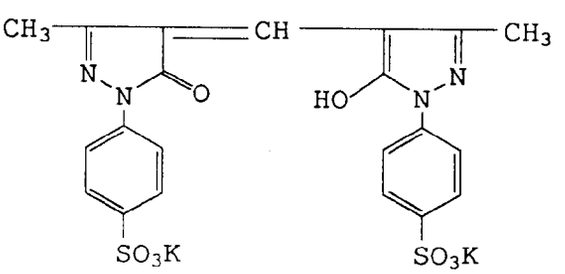
AI-1



AI-2



AI-3



Respective spectrally sensitive emulsions were prepared in the following procedures:

Blue-sensitive Silver Chlorobromide Emulsion (EmA)

A silver chlorobromide emulsion comprising grains having an average size of 0.7 μm and a silver bromide content of 90 mol% was chemically sensitized at 57°C with sodium thiosulfate and, then, sensitizing dye (D-1) and stabilizer (Z-1) were added.

Green-sensitive Silver Chlorobromide Emulsion (EmB)

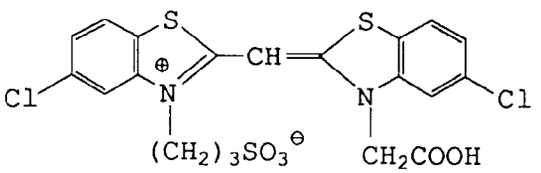
A silver chlorobromide emulsion comprising grains having an average size of 0.5 μm and a silver bromide content of 70 mol% was chemically sensitized at 59°C with sodium thiosulfate and, then, sensitizing dye (D-2) and stabilizer (Z-1) were added.

Red-sensitive Silver Chlorobromide Emulsion (EmC)

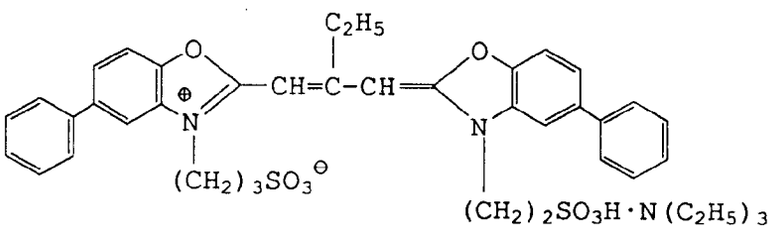
A silver chlorobromide emulsion comprising grains having an average size of 0.4 μm and a silver bromide content of 60 mol% was sensitized at 60°C with sodium thiosulfate, sensitizing dye (D-3) and a phenol resin and, then, stabilizer (Z-1) was added.

Stabilizer (Z-1): 4-Hydroxy-6-methyl-1,3,3a,7-tetrazaindene

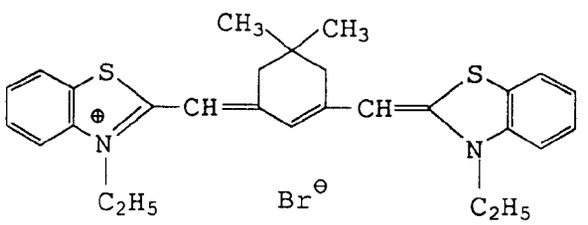
D-1



D-2



D-3



Samples 102 to 114 were prepared in the same manner as sample 101, except that the gelatin used in

sample 101 was changed as follows:

Sample No.	1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	7th layer
101	A	A	A	A	A	A	A
102	A	A	A	A	A	A	B
103	A	A	A	A	A	A	C
104	A	A	A	A	A	A	D
105	A	A	A	A	A	A	E
106	A	A	A	A	A	A	F
107	A	A	A	A	A	A	G
108	A	A	A	A	A	A	H
109	A	A	A	A	A	A	I
110	A	A	A	A	A	A	J
111	A	A	A	A	A	G	G
112	A	G	A	G	A	G	G
113	G	G	G	G	G	G	G
114	E	E	E	E	E	E	E

The gelatins used were as follows: isoelectric points are given in parentheses

A: Alkali-processed cattle-bone gelatin (5.0)
B: Alkali-processed pigskin gelatin (5.4)
C: Acid-processed cattle-bone gelatin (5.6)
D: Acid-processed pigskin gelatin (7.1)
E: Acid-processed pigskin gelatin (8.8)
F: Alkali-processed cattle-bone gelatin (5.2)
G: Alkali-processed cattle-bone gelatin (5.4)
H: Alkali-processed cattle-bone gelatin (5.6)
I: Esterified gelatin (5.5) obtained by esterifying gelatin A by use of methanol and hydrochloric acid
J: Amidated gelatin (5.4) obtained by subjecting gelatin A to aminoethylamidation by use of 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide and ethylenediamine

Gelatins A to E and F to H were subjected to cation and anion exchange treatment, and calcium contents of gelatins A to E and F to J were not more than 100 ppm, respectively. In Samples 113 and 114, gelatin used for emulsion preparation were also replaced by gelatin G and E, respectively.

After formation of the respective photographic component layers, each sample was once cooled to set the gelatin contained therein and then dried at 50°C.

Each sample was further subjected to hardening for 5 days at 35°C and 60% RH.

Then, the following evaluations were conducted using the samples so prepared.

Evaluation of Grossiness

Each sample was exposed to white light and processed under conditions described later, and then the surface grossiness of the resulting black ground sample was measured at an incident angle of 60° and a light-intercepting angle of 60° on a Glossmeter Model VG-ID made by Nippon Denshoku Kogyo Co.

Evaluation of Coatability

With a gray ground sample prepared by processing a uniformly exposed sample likewise, the number of failure spots per 10 m^2 and unevenness in density were visually checked.

A: unevenness is not observed in density.

B: unevenness is slightly observed in density within the limits allowed to a commercial article.
C: unevenness is observed in density beyond the limit allowed to a commercial article.
D: image quality is damaged by heavy unevenness in density.

Evaluation of Resistance against Finger Printing

After being kept in a refrigerator at 10°C for 24 hours, each unexposed sample was taken out and immediately transferred into a dark place of 23°C and 80% RH, allowed to stand for 60 seconds and then touched with the finger on the coated side. After being exposed to white light and processed under the following conditions, the sample was visually examined upon the desensitization appearing in the shape of finger prints.

A: no desensitization is caused.
B: desensitization is slightly observed within the limits allowed to a commercial article.
C: desensitization is observed beyond the limit allowed to a commercial article.
D: desensitization is heavily caused.

The results are shown in Table 3.

Standard Process	Temperature	Time
Color developing	38°C	3 min 30 sec
Bleach-fixing	33°C	1 min 30 sec
Washing	25 to 30°C	3 min
Drying	60 to 80°C	ca. 2 min

Compositions of the processing solutions were as follows:

Color Developer

Benzylalcohol	15 ml
Ethylene glycol	15 ml
Potassium sulfite	2.0 g
Potassium bromide	0.7 g
Sodium chloride	0.2 g
Potassium carbonate	30.0 g
Hydroxylamine sulfate	3.0 g
Polyphosphoric acid (TPPS)	2.5 g
3-Methyl-4-amino-N-ethyl-N-(β-methanesulfonamidoethyl) aniline sulfate	5.5 g
Optical whitening agent (4,4'-diaminostilbene-disulfonic acid derivative)	1.0 g
Potassium hydroxide	2.0 g

Water is added to make 1 liter, and the pH is adjusted to 10.20.

Bleach-fixer

Ammonium ferric ethylenediaminetetracetate dihydrate	
	60 g
Ethylediaminetetracetic acid	3 g
Ammonium thiosulfate (70% solution)	100 ml
Ammonium sulfite (40% solution)	27.5 ml

The pH is adjusted to 7.1 with potassium carbonate or glacial acetic acid, and then water is added to make 1 liter.

Table 3

Sample No.	Gloss (%)	Number of Failure Spots	Unevenness in Density	Resistance against Finger Printing
101 (Comparison)	78	0	A	A
102 (Comparison)	93	6	C	B
103 (Comparison)	92	4	C	C
104 (Comparison)	92	9	D	C
105 (Comparison)	91	8	D	C
106 (Invention)	92	1	A	A
107 (Invention)	93	0	A	A
108 (Invention)	91	1	B	B
109 (Comparison)	85	2	B	B
110 (Comparison)	84	1	B	B
111 (Invention)	93	0	A	A
112 (Invention)	92	0	A	A
113 (Invention)	93	0	A	A
114 (Comparison)	90	4	C	C

It can be seen in Table 3 that sample 101 using only an alkali-processed cattle-bone gelatin having an isoelectric point less than 5.0, which is preferably employed in ordinary photographic light-sensitive materials, is free from failure spots and unevenness in density and high in finger printing resistance, but it is low in gloss. Samples 102 to 105 and 114 using a pigskin gelatin or an acid-processed gelatin in the surface protective layer, though high in gloss, cause many failure spots and much unevenness in density, in addition to their insufficient finger printing resistance.

On the contrary, samples 106 to 113 using the gelatin of the invention are high in gloss, less in unevenness in density, and excellent in finger printing resistance.

It has also become apparent by minute observations on the samples of the invention that the gloss cannot

be increased so much in samples 109 and 110 using gelatins I and J of the invention whose isoelectric points are raised by chemical modification such as esterification or amidation.

On the other hand, samples 106, 107 and 111 to 113, which use gelatin F or G of the invention having an isoelectric point within the desirable limits of 5.2 to 5.5, clearly demonstrate the effect of the invention. It can also be found that use of the gelatin of the invention in the surface protective layer is useful in bringing out the effect of the invention sufficiently.

Example 2

A multilayer color light-sensitive material, sample 201, was prepared, as in Example 1 by forming the component layers shown in Tables 4 and 5 on the support used in Example 1. The coating solutions used were prepared in the following procedure.

Coating Solution for 1st Layer

A coating solution for the 1st layer was prepared by steps of dissolving 26.7 g of yellow coupler (YC-8), 10.0 g of dye image stabilizer (ST-1), 6.67 g of dye image stabilizer (ST-2), 0.67 g of antistain agent (HQ-1) and 6.67 g of high boiling organic solvent (DNP) in 60 ml of ethyl acetate, dispersing the resulting solution in 220 ml of 10% aqueous gelatin solution containing 7 ml of 20% surfactant (SU-2) with a supersonic homogenizer, mixing the yellow coupler dispersion so prepared with the blue-sensitive silver halide emulsion containing 8.67 g of silver described later, and adding anti-irradiation dye (AI-3) thereto.

Coating solutions for the 2nd to 7th layers were also prepared in similar manners.

Further, hardener (HH-1) was added in the 2nd and 4th layers, and hardener (HH-2) in the 7th layer. As coating aids, surfactants (SU-1) and (SU-3) were used to adjust the surface tension. The pH of each coating solution was adjusted to 5.9 with a diluted sulfuric acid or a diluted aqueous potassium hydroxide.

Table 4

Layer	Component	Amount (g/m2)
7th layer	gelatin A	1.00
6th layer (UV absorbing layer)	gelatin A	0.40
	UV absorbent (UV-1)	0.10
	UV absorbent (UV-2)	0.04
	UV absorbent (UV-3)	0.16
	antistain agent (HQ-1)	0.01
	DNP	0.20
	PVP	0.03
	anti-irradiation dye (AI-4)	0.02
5th layer (red-sensitive layer)	gelatin A	1.30
	red-sensitive silver chlorobromide emulsion (EM-R)	0.21
	cyan coupler (CC-2)	0.24
	cyan coupler (CC-8)	0.08
	dye image stabilizer (ST-1)	0.20
	antistain agent (HQ-1)	0.01
	HBS-1	0.20
	DOP	0.20
4th layer (UV absorbing layer)	gelatin A	0.94
	UV absorbent (UV-1)	0.28
	UV absorbent (UV-2)	0.09
	UV absorbent (UV-3)	0.38
	antistain agent (HQ-1)	0.03
	DNP	0.40

Table 5

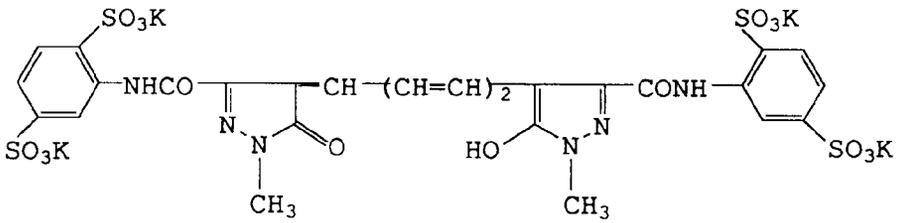
Layer	Component	Amount (g/m^2)
3rd layer(green-sensitive layer)	gelatin A	1.40
	green-sensitive silver chlorobromide emulsion (Em-G)	0.17
	magenta coupler (MC-10)	0.35
	dye image stabilizer (ST-3)	0.15
	dye image stabilizer (ST-5)	0.15
	dye image stabilizer (ST-6)	0.15
	DNP	0.20
	anti-irradiation dye (AI-1)	0.01
2nd layer(intermediate layer)	gelatin A	1.20
	antistain agent (HQ-3)	0.03
	antistain agent (HQ-4)	0.03
	antistain agent (HQ-5)	0.05
	antistain agent (HQ-6)	0.23
	DIDP	0.06
	fungicide (F-1)	0.002
1st layer(blue-sensitive layer)	gelatin A	1.20
	blue-sensitive silver chlorobromide emulsion (Em-B)	0.26
	yellow coupler (YC-8)	0.80
	dye image stabilizer (ST-1)	0.30
	dye image stabilizer (ST-2)	0.20
	antistain agent (HQ-1)	0.02
	anti-irradiation dye (AI-3)	0.01
	DNP	0.20
Support	polyethylene laminated paper	

* Amounts of silver halide emulsions are shown in amounts of silver present.

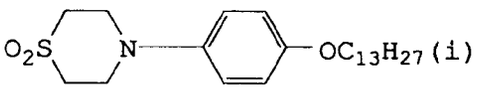
The additives used in respective layers were as follows:

HQ-3: 2,5-Di-sec-dodecylhydroquinone
HQ-4: 2,5-Di-sec-tetradecylhydroquinone
HQ-5: 2-Sec-dodecyl-5-sec-tetradecylhydroquinone
HQ-6: 2,5-Di(1,1-dimethyl-4-hexyloxycarbonylbutyl) hydroquinone
F-1: 2-Methyl-5-chloro-isothiazoline-3-one

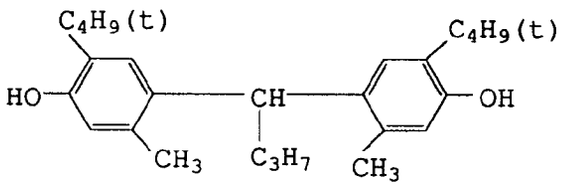
AI-4



ST-5



ST-6



Preparation of Blue-sensitive Silver Halide Emulsion Em-B

The following solutions A and B were simultaneously added over a period of 30 minutes to 1000 ml of 2% aqueous gelatin solution kept at 40°C, while controlling the pAg at 7.3 and the pH at 5.5. Then, the following solutions C and D were simultaneously added over a period of 180 minutes, with the reaction liquor controlled at pAg 7.3 and pH 5.5. The control of the pAg was carried out according to the method disclosed in Japanese Pat. O.P.I. Pub. No. 45437/1984, and that of the pH was made using a diluted sulfuric acid or an aqueous solution of potassium hydroxide.

Solution A	
Sodium chloride	3.42 g
Potassium bromide	0.03 g
Water is added to make	200 ml

Solution B	
Silver nitrate	10 g
Water is added to make	200 ml

Solution C	
Sodium chloride	102.7 g
Potassium bromide	1.0 g
Water is added to make	600 ml

Solution D	
Silver nitrate	300 g
Water is added to make	600 ml

After the addition, the resulting silver halide emulsion was desalted by use of 5% aqueous solution of Demol N made by Kao Atlas Co. and 20% aqueous solution of magnesian sulfate and, then, mixed with an aqueous gelatin solution. Emulsion EMP-1 prepared as above comprised monodispersed cubic grains having an average size of 0.85 μm, a coefficient of variation of 0.07 and a silver chloride content of 99.5 moles%.

Blue-sensitive silver halide emulsion Em-B was obtained by subjecting emulsion EMP-1 to chemical ripening at 50°C for 90 minutes using the following compounds.

Sodium thiosulfate	0.8 mg/mol AgX
Chloroauric acid	0.5 mg/mol AgX
Stabilizer (STAB-1)	6×10^{-4} mol/mol AgX
Sensitizing dye (D-1)	4×10^{-4} mol/mol AgX
Sensitizing dye (D-4)	1×10^{-4} mol/mol AgX

Preparation of Green-sensitive Silver Halide Emulsion Em-G

Emulsion EMP-2 comprising monodispersed cubic grains having an average size of 0.43 μm, a coefficient of variation of 0.08 and a silver chloride content of 99.5 moles% was prepared in the same manner as emulsion EMP-1, except that the addition time of solutions A and B as well as that of solutions C and D were changed.

Green-sensitive silver halide emulsion Em-G was obtained by subjecting emulsion EMP-2 to chemical ripening at 55°C for 120 minutes using the following compounds.

Sodium thiosulfate	1.5 mg/mol AgX
Chloroauric acid	1.0 mg/mol AgX
Stabilizer (STAB-1)	6×10^{-4} mol/mol AgX
Sensitizing dye (D-2)	4×10^{-4} mol/mol AgX

Preparation of Red-sensitive Silver Halide Emulsion Em-R

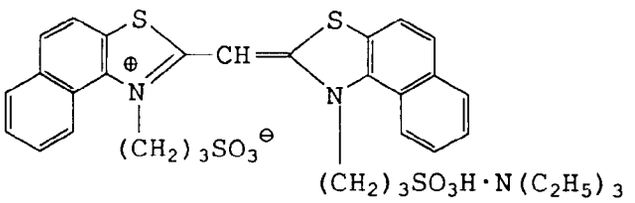
Emulsion EMP-3 comprising monodispersed cubic grains having an average size of 0.50 μm, a coefficient of variation of 0.08 and a silver chloride content of 99.5 moles% was prepared in the same manner as emulsion EMP-1, except that the addition time of solutions A and B as well as that of solutions C and D were changed.

Green-sensitive silver halide emulsion Em-R was prepared by subjecting emulsion EMP-3 to chemical ripening at 60°C for 90 minutes using the following compounds.

Sodium thiosulfate	1.8 mg/mol AgX
Chloroauric acid	2.0 mg/mol AgX
Stabilizer (STAB-1)	6×10^{-4} mol/mol AgX
Sensitizing dye (D-3)	1×10^{-4} mol/mol AgX

STAB-1: 1-(3-Acetamidophenyl)-5-mercaptotetrazole

D-4



Samples 202 to 214 were prepared in the same manner as sample 201, except that the same gelatins as those used in samples 102 to 114 were employed in place of the gelatin used in sample 201.

After the photographic component layers were formed, each sample was once cooled to set gelatin contained therein, dried at 50°C and then subjected to hardening for 5 days at 35°C and 60% RH.

Continuous processing was run under the following conditions using the samples prepared as above.

Process	Processing Temp.	Processing Time
Color developing	35.0 ± 0.3°C	45 sec
Bleach-fixing	35.0 ± 0.5°C	45 sec
Stabilizing	30 to 34°C	90 sec
Drying	60 to 80°C	60 sec

The replenishing rate of a processing solution was 80 ml per square meter of light-sensitive material. Composition of each processing solution was as follows:

Color Developer	Tank Sol.	Replenisher
Water	800 ml	800 ml
Triethanolamine	10 g	18 g
N,N-Diethylhydroxylamine	5 g	9 g
Potassium chloride	2.4 g	
1-Hydroxyethylidene-1,1-diphsphoinic acid	1.0 g	1.8 g
3-Methyl-4-amino-N-Ethyl-N-(β-methanesulfonamidoethyl) aniline sulfate	5.4 g	8.2 g

Optical whitening agent (4,4'-diamino-stilbenesulfonic acid derivative)	1.0 g	1.8 g
Potassium carbonate	27 g	27 g

Water is added to make 1 liter, and the pH of the tank solution is adjusted to 10.10 and that of the replenisher to 10.60.

Bleach-fixer (thank solution and replenisher are the same)

Ammonium ferric ethylenediaminetretracetate dihydrate	
	60 g
Ethylediaminetetracetic acid	3 g
Ammonium thiosulfate (70% solution)	100 ml
Ammonium sulfite (40% solution)	27.5 ml

Water is added to make 1 liter, and the pH is adjusted to 5.7 with potassium carbonate or glacial acetic acid.

Stabilizer (tank solution and replenisher are the same)

F-1	1.0 g
Ethylene glycol	1.0 g
1-Hydroxyethylidene-1,1-diphsphonic acid	2.0 g
Ethylenediaminetetracetic acid	1.0 g
Aqueous ammonia (20%)	3.0 g
Optical whitening agent (4,4'-diaminostilbenesulfonic acid derivative)	1.5 g

Water is added to make 1 liter, and the pH is adjusted to 7.0 with sulfuric acid or potassiun hydroxide.

After the continuous processing, evaluation of the samples was carried out as in Example 1.

The evaluation results are shown in Table 6.

Table 6

Sample No.	Gloss (%)	Number of Failure Spots	Unevenness in Density	Resistance against Finger Printing
201 (Comparison)	79	0	A	A
202 (Comparison)	92	7	C	C
203 (Comparison)	92	6	C	D
204 (Comparison)	93	6	C	D
205 (Comparison)	90	5	D	D
206 (Invention)	93	0	A	A
207 (Invention)	93	0	A	A
208 (Invention)	91	1	B	B
209 (Comparison)	84	2	B	B
210 (Comparison)	86	2	B	B
211 (Invention)	94	0	A	A
212 (Invention)	93	0	A	A
213 (Invention)	93	0	A	A
214 (Comparison)	91	4	C	D

As is apparent from Table 6, the effect of the invention is demonstrated in this example, too. Particularly, when a silver halide emulsion having a high silver chloride content is used, the samples using a gelatin according to the invention have a high finger printing resistance, while the samples using a conventional acid-processed or pigskin gelatin are low in finger printing resistance.

Claims

1. Silver halide photographic light-sensitive material comprising a support having thereon one or more photographic component layers including a silver halide emulsion layer, wherein at least one of said photographic component layers contains an alkali-processed cattle-bone gelatin, without chemical modification, having an isoelectric point of not lower than 5.2.

2. The light-sensitive material of claim 1, wherein said at least one photographic component layer containing said alkali-processed cattle-bone gelatin having an isoelectric point of not lower than 5.2 is a layer provided at the position farthest from said support among said photographic component layers.

3. The light-sensitive material of claim 1, wherein said silver halide emulsion layer contains silver halide grains having a silver chloride content of not less than 95 mol%.

4. The light-sensitive material of claim 1, wherein said alkali-processed cattle bone gelatin has an isoelectric point of from 5.2 to 6.0.

5. The light-sensitive material of claim 4, wherein said alkali-processed cattle bone gelatin has an isoelectric point of from 5.2 to 5.5.

6. The light-sensitive material of claim 1, wherein said gelatin having an isoelectric point not lower than 5.2 is contained said at least one photographic component layer in a ratio of not less than 50 % by weight of the whole gelatin contained in said at least one photographic component layer.

7. The light-sensitive material of claim 6, wherein the isoelectric point of a mixture of gelatin composing said at least one photographic component layer is not lower than 5.2

8. The light-sensitive material of claim 1, wherein difference between the pH value of a coating solution to form said photographic component layer containing said gelatin having an isoelectric point of not lower than 5.2 and the isoelectric point of said gelatin is not larger than 0.3.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 30 0103

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 285 994 (AGFA-GEVAERT AG) 12 October 1988 * See claim 1 and description, page 3, lines 4-15 *	1-8	G03C1/047
D,X	WORLD PATENTS INDEX LATEST Week 9035, Derwent Publications Ltd., London, GB; AN 90-266249 & JP-A-2 188 753 (KONICA CORP.) 24 July 1990 * abstract *	1-8	
A	DE-A-2 516 967 (FUJI PHOTO FILM CO.) 30 October 1975 * See claim 4 and description, page 5, last paragraph *	1-8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G03C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	25 MARCH 1993	GUILLEMOIS F.S.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

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