# United States Patent

[11] 3,615,501


[72] Inventors Reiichi Ohi;
Isao Shimamura; Tadao Shishido, all of
Kanagawa, Japan



[21] Appl. No. 868,583
[22] Filed Oct. 22, 1969
[45] Patented Oct. 26, 1971



[73] Assignee Fuji Photo Film Co. Ltd.
Nakanuma, Minami-Ashigara-Machi,
Ashigara-Kamigun, Kanagawa, Japan



[32] Priority Oct. 22, 1968
[33] Japan
[31] 43/76923


[54] COLOR PHOTOGRAPHIC DEVELOPING PROCESS
6 Claims, No Drawings


[52] U.S. Cl. 96/55, 96/66.5, 96/109
[51] Int. Cl. G03c 5/30, G03c 7/30
[50] Field of Search 96/55, 66.5, 56.5, 109, 22



[56] References Cited

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,324,123 | 7/1943 | Weissberger | 96/66.5 X |
| 2,384,593 | 9/1945 | Bean | 96/66.5 X |
| 2,939,789 | 6/1960 | Dersch et al. | 96/66.5 |
| 3,137,578 | 6/1964 | De Selms | 96/109 |
| 3,165,407 | 1/1965 | McCarthy | 96/55 X |
| 3,271,154 | 9/1966 | Dersch et al. | 96/66.5 |
| 3,495,981 | 2/1970 | Nagae et al. | 96/55 |

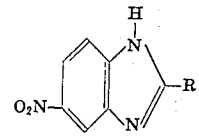


*Primary Examiner*—John T. Goolkasian
*Assistant Examiner*—Joseph C. Gil
*Attorney*—Sughrue, Rothwell, Mion, Zinn & Macpeak



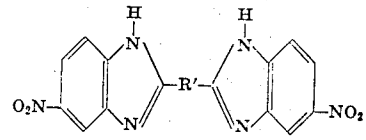
**ABSTRACT:** A process for developing exposed multilayer color photographic silver halide light-sensitive elements which comprises processing said color photographic element in a processing composition containing a compound represented by the general formula:

(I)



wherein R represents an alkyl group having four to 7 carbon atoms or a compound represented by the general formula:

(II)



wherein R′ represents an alkylene group having one to eight carbon atoms.

# COLOR PHOTOGRAPHIC DEVELOPING PROCESS

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a process for developing color photographic light-sensitive elements and more particularly to a process for developing color photographic light-sensitive elements using an additive which is effectively employed in the case of conducting development at a high temperature.

2. Description of the Prior Art

A multilayer color photographic element generally has at least three different sensitive silver halide emulsion layers superimposed on a support, for example, a lowermost red-sensitive emulsion layer, a green-sensitive emulsion layer, a yellow filter layer, and an uppermost blue-sensitive emulsion layer. These are generally formed on a support in this order.

Recently, development of color photographic elements has tended to be carried out at high temperatures, i.e., higher than 30° C., to reduce the developing time. Such a developing process is usually called a "high temperature process" or a "high temperature rapid process." Hereinafter, the term "high temperature processing" in this specification means color photographic developing processing at a temperature higher than 30° C.

One of the troubles encountered in high temperature processing is the phenomenon that the development of fog becomes dominant over image development due to a high activation energy for fog development. Hence the image developability, which is the ratio of the image developing density to the fog developing density, is reduced.

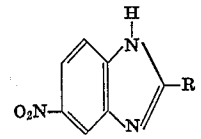
To improve this point, one would think it would be easy to add a developing inhibitor to a processing solution, but even if conventionally known developing inhibitors, such as 5-nitrobenzimidazole and the like, are employed, the antifogging effect by the additive is less when high-temperature processing is used. In this case, although the antifogging effect may be increased by using a large quantity of the developing inhibitor, image development is also inhibited, and hence the use of a large amount of developing inhibitor is not very useful for the avowed purpose.

## SUMMARY OF THE INVENTION

The inventors have found that the formation of fog at high temperature processing can be effectively prevented by adding alkylenebis-5-nitro-2-benzimidazole compounds or 2-alkyl-substituted-5-nitrobenzimidazole compounds to the developing solution.

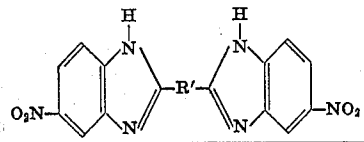
A process for developing exposed multilayer color photographic silver halide light-sensitive elements which comprises processing said color photographic element in a processing composition containing a compound represented by the general formula:

(I)



wherein R represents an alkyl group having 4 to 7 carbon atoms or a compound represented by the general formula:

(II)



wherein R' represents an alkylene group having 1 to 8 carbon atoms.

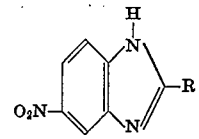


Therefore, one object of the present invention is to provide a process for effectively preventing the formation of fogs in a high temperature developing process for color photographic light-sensitive elements.

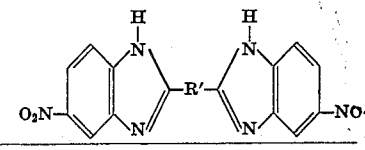
## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The compound used in the present invention is represented by the general formula:

(I)



(II)



wherein R represents an alkyl group having 4–7 carbon atoms and R' represents an alkylene group having 1–8 carbon atoms.

According to the present invention, by adding the above compound to a developing solution used in high-temperature processing, the formation of development fog can be effectively prevented to provide a development balance, and the total color balance of the image and the quality thereof are further improved. Thus, on merit of the present invention is in enabling the processing of photographic light-sensitive elements at a temperature of from 30° to 70° C. (at least in the case of using the compound of this invention).

The compound of the present invention is particularly effective in the so-called coupler-in-developer type reversal development, in which color developments are conducted in three steps, i.e., cyan development, yellow development, and magenta development. In other words, when the aforementioned reversal development is conducted at a high temperature without using the compound of this invention, the cyan development provides cyan fogs in the blue-sensitive emulsion layer and the green-sensitive emulsion layer which are to be color developed in a yellow color developer and a magenta color developer, respectively. This gives severe color mixing or color stain and provides an image having a bad color balance.

Further, the above-mentioned compound of the present invention may effectively be incorporated in a first black and white developing solution in a coupler-in-developer type color reversal developing process, as well as a coupler-in-emulsion layer type color reversal developing process. Essentially as over development of the uppermost layer due to a high-temperature development is prevented and the formation of development fogs therein is suppressed by the use of the compound of this invention, the reversal color image thus obtained has an excellent image quality with good color balance and high reversal color density. Moreover, when the reversal color development process involves a pretreatment step, such as a prehardening step, before the first black and white development, the compound of this invention can effectively be incorporated in the pretreatment bath.

By incorporating the compound of this invention in a color developing solution in the development process for color negative films or color papers, the reduction in the gamma value caused by the increase in the formation of fogs in the high-temperature process can be prevented, and an image having good color balance is obtained with a good development balance.

A coupler-in-developer type color developing solution in which the above-mentioned compound of the present invention is incorporated contains, in addition to a color-developing agent and a coupler, an alkali such as sodium hydroxide or sodium carbonate, a salt such as sodium sulfate, a developing inhibitor such as an alkali halide, and an antioxidant such as sodium sulfite or hydroxylamine sulfate.

As the color developing agent, there are employed p-phenylene-diamine derivatives, such as N,N-diethyl-p-phenylenediamine sulfite N,N-diethyl-3-methyl-p-phenylenediamine hydrochloride, 4-amino-3-methyl-N-ethyl-N-methanesulfonamide ethylaniline sulfate, 4-amino-3-methyl-N-ethyl-N-hydroxyethyl aniline sulfate, and N-ethyl-N-hydroxyethyl-p-phenylene-diamine sulfate.

As the couplers, there are used cyan couplers, such as 2,4-dichloro-1-naphthol, 2,4-dichloro-5-tolysulfonamido-1-naphthol, 1-hydroxy-2-benzylnaphthamide, 2,6-dibromo-1,5-dihydroxynaphthaline, etc., and yellow couplers such as benzoylacetanilide, w-benzoyl-4-(p-toluenesulfonamide)acetanilide, etc. Other couplers soluble in the developing solution in general use can be employed.

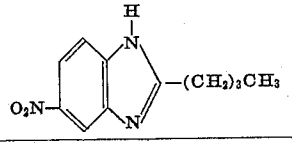
As the first black and white developer for developing color reversal films, an aqueous solution containing at least one developing agent such as hydroquinone, phenidone and Metol is generally used. The developer further usually contains a salt such as sodium sulfate, a pH adjusting agent and a buffer agent such as borax, boric acid, sodium hydroxide, sodium carbonate, etc., and a developing inhibitor such as an alkali halide. To a color developer for color negative films or color papers there are usually added a color developing agent such as a p-phenylene-diamine derivative, a salt such as sodium sulfate, a pH-adjusting agent, and a buffer agent such as sodium hydroxide, sodium carbonate, and sodium phosphate, a developing inhibitor such as alkali halide and an antioxidant such as sodium sulfite and hydroxylamine sulfate.

The above-mentioned objects of the present invention can be achieved by adding to the aforesaid processing solutions the 5-nitrobenzimidazole compound represented by the general formula described above.

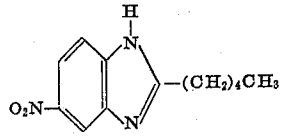
The preferred concentration of the compound of this invention is from about $1\times10^{-6}$ mole/liter to about $1\times10^{-2}$ mole/liter. However, the optimum concentration thereof depends upon many factors, such as, the kind of compound employed, the composition of the processing solution, the activity of the developer, the processing temperature, the characteristics of multilayer color photographic light-sensitive elements, and the like.

Typical examples of the 5-nitrobenzimidazole compounds used in the present invention are shown below, although the invention shall not be limited only to them.

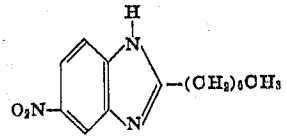
Compound 1.—M.P. 139° C.



Compound 2.—M.P. 235° C.

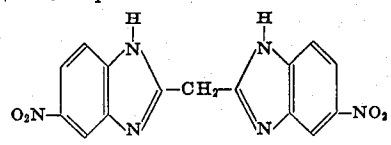


Compound 3.—M.P. 231° C.

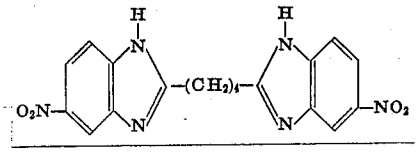




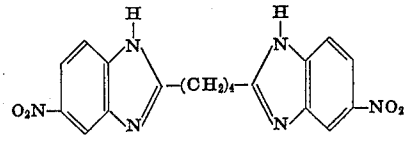
Compound 4.—M.P. 300° C.



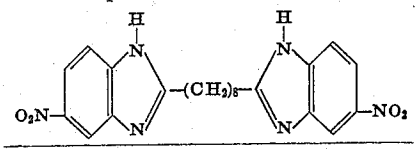
Compound 5.—M.P. 290° C.



Compound 6.



Compound 7.—M.P. 136° C.



The aforesaid compounds represented by the general formulas can be prepared by known methods using orthophenylenediamines as the raw materials (cf.: "Nippon Yakugaku Zasshi," Vol. 78, 242–244 (1958); "Journal of the Chemical Society," 2389–2398 (1952); and "Journal of the Chemical Society," 2238–2240 (1953)).

Examples of preparing the compounds represented by the above-mentioned general formula are shown below.

Preparation of Compound 1

A mixture of 22 g. of orthophenylenediamine and 30 g. of valeric acid was refluxed by heating for 2 hours and the product was poured into ethanol and neutralized with an aqueous solution of potassium hydroxide. The crystal was collected by filtration and recrystallized from a mixed solvent of ethanol and water to provide 14 g. of product as needles. Ten grams (10 g.) of the crystal was added to 60 ml. of concentrated sulfuric acid and to the mixture there was added dropwise 6.5 ml. of nitric acid (gradually) with stirring under ice cooling. Thereafter, the system was stirred for 2 hours under ice cooling, and the product was poured in ice water, neutralized with aqueous ammonia, and then the crystal thus formed was recrystallized from a mixed solvent of ethanol and water to provide a white crystal of compound 1 having a melting point of 139° C.

Preparation of Compound 2

A mixture of 20 g. of orthophenylenediamine and 30 g. of caproic acid was refluxed under heating for 2 hours, and the product was poured in ethanol and neutralized with aqueous ammonia. The crystal thus formed was collected and recrystallized from ethyl acetate to provide 8 g. of product as needles melting at 160° C. Four grams (4 g.) of the crystal was dissolved in 30 ml. of concentrated sulfuric acid and to the solution was added 3 g. of potassium nitrate, with stirring, under ice cooling. Thereafter, the system as stirred for 3 hours under ice cooling and the product was poured in ice water and neutralized with aqueous ammonia. The crystal thus formed was recrystallized from a mixed solvent of ethanol and water to provide the crystal of Compound 2 having a melting point of 235° C.

Preparation of compound 4

In 30 ml. of ethylene glycol were refluxed, under heating, 21 g. of orthophenylenediamine and 10.2 g. of malonamide for 4 hours. Then, 200 ml. of water was added to the solution. The crystal thus obtained was collected and recrystallized from ethanol to provide 6 g. of yet another crystal. The crystal was dissolved in 25 ml. of concentrated sulfuric acid and then 5 g. of potassium nitrate was added gradually to the solution, with stirring, under ice cooling. Thereafter, the system was stirred for 2 hours under ice colling, poured in ice water and neutralized with sodium carbonate. When the crystal thus obtained was recrystallized from methanol, the crystal of Compound 4 having a melting point of above 300° C. was obtained.

Preparation of Compound 6

A mixture of 22 g. of orthophenylenediamine and 15 g. of adipic acid was refluxed under heating for 6 hours in 200 ml. of hydrochloric acid. The crystal obtained by cooling the product was collected, dissolved in water, and the solution was neutralized with sodium carbonate to provide 18 g. of a crystal having a melting point of 259° C. Six grams (6 g.) of the crystal was dissolved in 40 ml. of concentrated sulfuric acid and to the solution there was gradually added 5 g. of potassium nitrate, with stirring, under ice cooling. Thereafter, the mixture was stirred for 2 hours under ice cooling. The reaction product was poured into ice water, neutralized with aqueous ammonia, and the crystal thus formed was collected and recrystallized from methanol to provide the crystal of Compound 6, as needles, melting at 259° C. The following examples are given in order to illustrate the invention in more detail.

## EXAMPLE 1

A multilayer color photographic film was prepared by applying, in this order, a silver iodobromide emulsion having red sensitivity, a silver iodobromide emulsion having green sensitivity, a yellow filter layer composed of colloidal silver, and a silver iodobromide emulsion having blue sensitivity to a cellulose triacetate film. The color photographic film was exposed by means of a sensitometer and then subjected to the following procedures: The processing temperature, including water washing, was 40° C.

| Processing | Time |
|---|---|
| Prehardening | 30 sec. |
| Water washing | 30 sec. |
| First black & white development | 75 sec. |
| Water washing | 30 sec. |
| Reversal exposure (red) from back | 200 CMS. |
| Cyan color development | 3 min. |
| Water washing | 30 sec. |
| Reversal exposure (blue) from front | 200 CMS. |
| Yellow color development | 90 sec. |
| Water washing | 30 sec. |
| Second black & white development | 15 sec. |
| Magenta color development | 2 min. |
| Water washing | 1 min. |
| Bleaching | 1 min. |
| Fixing | 1 min. |
| Water washing | 1 min. |

The compositions used for the processing solutions used above were as follows:

Prehardening solution:

| | |
|---|---|
| Sodium hexamethaphosphate | 1.0 g. |
| Sodium bisulfite | 5.0 g. |
| Sodium pyrophosphate | 15.0 g. |
| Sodium sulfate | 150.0 g. |
| Potassium bromide | 2.0 g. |
| Sodium hydroxide | 0.1 g. |
| Formalin (37%) | 15.0 ml. |
| Water to make 1,000 ml. | |

First black & white developer:

| | |
|---|---|
| N-Methyl-p-aminophenol | 5.0 g. |
| Sodium sulfite | 70.0 g. |
| Hydroquinone | 2.0 g. |
| Sodium carbonate (monohydrate) | 41.0 g. |
| Potassium bromide | 4.0 g. |
| Potassium thiocyanate | 1.6 g. |
| Potassium iodide (0.1% aq. soln.) | 10.0 ml. |
| Water to make 1,000 ml. | |

Cyan color development:

| | |
|---|---|
| Potassium bromide | 3.0 g. |
| Potassium iodide (0.1% aq. soln.) | 10.0 ml. |
| Sodium sulfite | 10.0 g. |
| Sodium sulfate | 60.0 g. |
| Potassium thiocyanate | 1.0 g. |
| 4-Amino-3-methyl-N-ethyl-N-hydroxyethyl aniline sulfate | 2.5 g. |
| Sodium hydroxide | 3.0 g. |
| 1.5-dihydroxy-2,6-dibromo-naphthalene | 2.0 g. |
| Monobenzyl-p-aminophenol | 0.4 g. |
| p-Aminophenol hydrochloride | 0.1 g. |
| Water to make 1,000 ml. | |

Yellow color developer:

| | |
|---|---|
| Sodium sulfite | 10.0 g. |
| Potassium bromide | 0.5 g. |
| Potassium iodide (0.1% aq. soln.) | 25.0 ml. |
| 5-Nitrobenzimidazole | 0.1 g. |
| Sodium sulfate | 60.0 g. |
| N,N-Diethyl-p-phenylene-diamine sulfite | 2.5 g. |
| Sodium hydroxide | 2.5 g. |
| W-Benzoyl-4-(p-toluenesulfoamido)-acetanilide | 1.8 g. |
| Water to make 1,000 ml. | |

Second black & white developer:

| | |
|---|---|
| N-Methyl-p-aminophenol sulfate | 1.0 g. |
| Sodium sulfite | 50.0 g. |
| Hydroquinone | 1.0 g. |
| Sodium carbonate (monohydrate) | 41.0 g. |
| Potassium bromide | 2.5 g. |
| Water to make 1,000 ml. | |

Magenta color developer:

| | |
|---|---|
| Sodium sulfite | 5.0 g. |
| Potassium bromide | 1.0 g. |
| Potassium thiocyanate | 1.0 g. |
| Sodium sulfate | 60.0 g. |
| N,N-diethyl-3-methyl-p-phenylenediamine hydrochloride | 2.5 g. |
| Sodium hydroxide | 2.0 g. |
| 1-phenyl-3-(m-nitrobenzoylamino)-—5-pyrazolone | 1.4 g. |
| Ethylenediamine | 8.0 ml. |
| Water to make 1,000 ml. | |

Bleaching solution:

| | |
|---|---|
| Potassium ferricyanide | 100 g. |
| Potassium bromide | 30 g. |
| Water to make 1,000 ml. | |

Fixing solution:

| | |
|---|---|
| Sodium thiosulfate | 150 g. |
| Sodium sulfite | 10 g. |
| Water to make 1,000 ml. | |

In the above-mentioned coupler-in-developer type color reversal processing, the compound of the present invention was added in the cyan color developer as shown in the following table:

| Test No. | Additive | Amount |
|---|---|---|
| 1 (control) | None | |
| 2 | Compound 4 | $0.67\times10^{14}$ mole/liter |
| 3 | Compound 5 | $0.67\times10^{14}$ mole/liter |
| 4 | Compound 6 | $0.67\times10^{14}$ mole/liter |
| 5 | Compound 7 | $0.67\times10^{14}$ mole/liter |
| 6 | 5-Nitrobenz-imidazole (conventional) | $1.34\times10^{14}$ mole/liter |

The photographic properties obtained as the result of the above color-development processings are shown in the following table. As the photographic properties selected for the table, the blue density ($D_b$ max) and the red density ($D_r$max) at the maximum density portion (D max) were shown. Furthermore, as the red color purity, the ratio ($D_r/D_b$) of the red filter light density to the blue filter light density at the portion exposed to red light, and the ratio ($D_r/D_g$) of the red filter light density to the green filter light density at the red exposed portion, were shown.

These values relate to evaluating the purity of the reproduced color when a red object is reproduced as a color photograph The lower these ratios are, the better the purity of the red color on photographic material reproduced from an object.

| Test No. | $D_b$max | $D_r$max | $D_r/D_b$ | $D_r/D_g$ |
|---|---|---|---|---|
| 1 | 1.87 | 1.63 | 0.95 | 1.12 |
| 2 | 3.35 | 3.21 | 0.30 | 0.32 |
| 3 | 3.30 | 3.28 | 0.27 | 0.34 |
| 4 | 3.29 | 3.08 | 0.31 | 0.39 |
| 5 | 3.02 | 2.71 | 0.35 | 0.42 |
| 6 | 2.91 | 2.40 | 0.48 | 0.63 |

As is clear from the above table, the use of a conventionally known developing inhibitor, 5-nitrobenzimidazole, gave undesirable results in that the maximum density was lowered and the red color purity was also lowered (caused by the contamination of cyan into the portion exposed to red light). On the other hand, by the addition of the compound of this invention, the maximum density was increased and the red color purity was also improved.

## EXAMPLE 2

The processing of example 1 were followed while adding to the cyan color developer the compound of the present invention as shown in the following table.

For comparison, comparative examples using 5-nitrobenzimidazole and other developing inhibitors are also shown in the table.

| Test No. | Additive | Amount |
|---|---|---|
| 1 | 5-nitrobenzimidazole | $1.34\times10^{14}$ mole/liter |
| 2 | 2-methyl-5-nitrobenz-imidazole | $1.34\times10^{14}$ mole/liter |
| 3 | 2-ethyl-5-ntrobenz-imidazole | $1.34\times10^{14}$ mole/liter |
| 4 | 5-nitro-2-propyl benzimidazole | $1.34\times10^{14}$ mole/liter |
| 5* | Compound 1 | $1.34\times10^{14}$ mole/liter |
| 6* | Compound 2 | $1.34\times10^{14}$ mole/liter |
| 7* | Compound 3 | $1.34\times10^{14}$ mole/liter |
| 8 | 2-nonyl-5-nitrobenz-imidazole | $1.34\times10^{14}$ mole/liter |
| 9 | 5-nitro-2-undecylbenz-imidazole | $1.34\times10^{14}$ mole/liter |

*Present invention:

The photographic properties obtained by the processings shown are given in the following table, in which the same evaluations as in example 1 were made.

| Test No. | $D_b$ max | $D_r$ max | $D_r/D_g$ | $D_r/D_b$ |
|---|---|---|---|---|
| 1 | 2.91 | 2.40 | 0.45 | 0.63 |
| 2 | 2.68 | 2.32 | 0.64 | 0.80 |
| 3 | 2.21 | 2.04 | 0.86 | 0.97 |
| 4 | 2.53 | 2.26 | 0.59 | 0.64 |
| 5* | 3.31 | 3.18 | 0.31 | 0.35 |
| 6* | 3.42 | 3.34 | 0.25 | 0.31 |
| 7* | 3.37 | 3.25 | 0.26 | 0.33 |
| 8 | 2.57 | 2.28 | 0.84 | 0.95 |
| 9 | 2.18 | 2.01 | 0.93 | 1.08 |

As shown in the above table, only in the case of using the compounds of this invention (test Nos. 5, 6 and 7) were good results obtained.

## Example 3

A multilayer color photographic reversal film having three differentially sensitized silver halide emulsion layers, each containing a color coupler, was exposed by means of a sensitometer and subjected, at 37° C., to the following procedures:

| Processing | Time |
|---|---|
| First black & white development | 3 min. |
| First stopping | 30 sec. |
| Water washing | 1 min. |
| Color development | 210 sec. |
| Second stopping | 30 sec. |
| Water washing | 1 min. |
| Bleaching | 90 sec. |
| Fixing | 1 min. |
| Water washing | 1 min. |

The compositions of the processing solutions used in the above procedures were as follows:

First black and white developer

| | |
|---|---|
| Sodium hexamethaphosphate | 1.0 g. |
| 1-phenyl-3-pyrazolidone | 0.3 g. |
| Sodium sulfite | 50.0 g. |
| Hydroquinone | 6.0 g. |
| Sodium carbonate (monohydrate) | 35.0 g. |
| Potassium bromide | 2.0 g. |
| Potassium thiocyanate | 1.0 g. |
| Potassium iodide (0.1% aq. soln.) | 10 ml. |
| Water to make 1,000 ml. | |

First and second stopping solution

| | |
|---|---|
| Acetic acid | 25 ml. |
| Sodium acetate | 3 g. |
| Water to make 1,000 ml. | |

Color developer:

| | |
|---|---|
| Sodium hexamethaphosphate | 1.0 g. |
| Benzyl alcohol | 6.0 ml. |

| | |
|---|---|
| Sodium sulfite | 5.0 g. |
| Trisodium phosphate | 40.0 g. |
| Potassium bromide | 0.2 g. |
| Potassium iodide (0.1% aq. soln.) | 10.0 ml. |
| Sodium hydroxide | 6.5 g. |
| 4Amino-3-methyl-N-ethyl-N-methane-sulfoamidoethylaniline sulfate | 10.0 g. |
| Ethylenediamine | 8.0 ml. |
| Water to make 1,000 ml. | |

Bleaching solution:

| | |
|---|---|
| Potassium ferricyanide | 100 g. |
| Potassium bromide | 30.0 g. |
| Water to make 1,000 ml. | |

Fixing solution:

| | |
|---|---|
| Sodium thiosulfate | 150 g. |
| Sodium sulfite | 10 g. |
| Water to make 1,000 ml. | |

In the above-mentioned coupler-in-emulsion layer-type reversal processing, the compound of the present invention was incorporated in the first black and white developer as shown in the following table. For comparison, comparative experiments were conducted without incorporating the compound in the developer and, in another case, by adding a conventional developing inhibitor, 5-nitrobenzimidazole, to the developer.

| Test No. | Additive | Amount |
|---|---|---|
| 1 | none | |
| 2 | Compound 5 | $0.50\times10^{-4}$ mole/liter |
| 3 | Compound 2 | $1.00\times10^{-4}$ mole/liter |
| 4 | 5-nitrobenzimidazole | $1.00\times10^{-4}$ mole/liter |

The results obtained are shown in the following table, in which the photographic properties shown are the blue density ($D_b$max) and the red density ($D_r$max) at the maximum density (D max) portion of the image.

| Test No. | $D_b$max | $D_r$max |
|---|---|---|
| 1 | 2.4 | 3.4 |
| 2 | 3.3 | 3.5 |
| 3 | 3.5 | 3.5 |
| 4 | 2.7 | 3.4 |

As shown in the above table, by the addition of the compound of the present invention, the blue density ($D_b$max) is sufficiently increased and a better image quality (showing a good balance with the red density ($D_r$max)) was obtained.

## EXAMPLE 4

A multilayer color photographic negative film having three differently sensitive silver halide emulsion layers each containing therein a color coupler was exposed by means of a sensitometer and subjected to the following processings. The processing temperature was 35° C.

| Processing | Time |
|---|---|
| Color development | 3 min. |
| Stopping | 30 sec. |
| Water washing | 30 sec. |
| Bleaching | 1 min. |
| Fixing | 90 sec. |
| Water washing | 1 min. |

The compositions of the processing solutions in the above processings were as follows:

Color developer:

| | |
|---|---|
| Sodium hexamethaphosphate | 1.0 g. |
| Benzyl alcohol | 5.0 g. |
| Sodium sulfite | 3.0 g. |
| Sodium carbonate | 41.0 g. |
| Sodium hydroxide | 1.0 g. |
| 4-Amino-3-methyl-N-ethyl-N-methane-sulfoamidoethylaniline sulfate | 5.0 g. |
| Potassium bromide | 0.5 g. |
| Water to make 1,000 ml. | |

Stopping solution:

| | |
|---|---|
| Acetic acid | 25 ml. |
| Sodium acetate | 3 g. |
| Potassium alum | 10 g. |
| Water to make 1,000 ml. | |

Bleaching solution:

| | |
|---|---|
| Potassium ferricyanide | 100 g. |
| Potassium bromide | 20.0 g. |
| Water to make 1,000 ml. | |

Fixing solution:

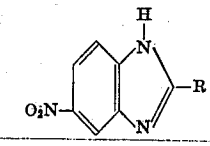
| | |
|---|---|
| Sodium thiosulfate | 150 g. |
| Sodium sulfite | 10 g. |
| Water to make 1,000 ml. | |

The results obtained by the above coupler-in-emulsion layer type negative color developing procedure were compared with the results obtained by adding Compound 2 of the present invention to the color developer in an amount of $5\times10^{-4}$mole/liter. By the addition of Compound 2 of this invention, the uppermost blue-sensitive emulsion layer of the color film was prevented from being excessively developed and each of the blue-sensitive emulsion layers, the green-sensitive emulsion layer, and the red-sensitive emulsion layer could be developed with good balance.

What we claim is:

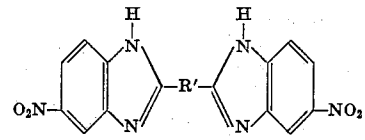
1. A process for developing exposed multilayer color photographic silver halide light-sensitive elements which comprises processing said color photographic element in a processing composition containing a compound represented by the general formula:

(I)



wherein R represents an alkyl group having 4 to 7 carbon atoms or a compound represented by the general formula:

(II)



wherein R′ represents an alkylene group having 1 to 8 carbon atoms.

2. The process according to claim 1 wherein the concentration of said compound in said processing solution is from about $1\times10^{-16}$ mole/liter to about $1\times10^{-12}$ mole/liter.

3. The process according to claim 1 wherein said multilayer color photographic element is a coupler-in-developer type color photographic element and said compound is incorporated in the cyan color developer.

4. The process according to claim 1 wherein said multilayer color photographic element is a coupler-in-developer type color photographic element and said compound is incorporated in the first black and white developer or in a pretreatment bath before the black and white development.

5. The process according to claim 1 wherein said multilayer color photographic element is a coupler-in-emulsion layer-type color photographic element and said compound is incorporated in the black and white developer.

6. The process according to claim 1 wherein said process is a high temperature process conducted at a temperature higher than 30° C.

* * * * *