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3,249,435

PHOTOGRAPHIC PRODUCTS AND PROCESSES
Howard G. Rogers, Weston, Mass., assignor to Polaroid Corporation, Cambridge, Mass., a corporation of Delaware
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17 Claims. (Cl. 96—29)

This application is in part a continuation of my co-pending application Serial No. 786,766, filed January 14, 1959, and now abandoned. The subject matter in said Serial No. 786,766 has been incorporated in continuation-in-part application Serial No. 354,963, filed March 26, 1964.

The present invention relates to color photography and more particularly to novel photographic products and processes.

One object of the invention is to provide novel photographic products for color diffusion transfer processes which embody means for protecting the transfer image from the deleterious effects of sunlight.

Another object of this invention is to provide novel photographic processes which produce color transfer images which have enhanced resistance to sunlight.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others, and the product possessing the features, properties and the relation of elements which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description.

The present invention is particularly related to color diffusion transfer processes. In such processes a photosensitive element including a silver halide emulsion layer is exposed and the exposed photosensitive element is developed and, concurrent with and under the control of this development, an imagewise distribution of mobile organic color-providing substances is formed. At least a portion of these color-providing substances is transferred to a superposed image-receiving stratum to form a colored image thereon. As examples of such processes, mention may be made of the processes disclosed and claimed in U.S. Patent No. 2,983,606, issued May 9, 1961, to Howard G. Rogers, wherein dye developers (i.e., compounds which contain in the same molecule both the chromophoric system of a dye and also a silver halide developing function) are the color-providing substances; the processes claimed and disclosed in U.S. Patent No. 2,647,049, issued July 28, 1953, to Edwin H. Land, wherein color developers are employed to develop the latent image and color couplers are the color-providing substances; and the processes disclosed in U.S. Patent No. 2,774,668, issued December 18, 1956, to Howard G. Rogers, wherein complete, pre-formed dyes are used as the color-providing substances; and the color processes employing screen-type negatives disclosed and claimed in U.S. Patent No. 2,968,554, issued January 17, 1961, to Edwin H. Land. By the term "organic color-providing substances," as used herein, is meant dyes, including dye developers and dye intermediates, e.g., color couplers.

In an especially useful mode of carrying out color diffusion transfer processes such as described above, the color-providing substances are disposed in a separate alkali-permeable layer in the photosensitive element. The separate alkali-permeable layer may be placed either in front of or behind the photosensitive emulsion with which it is associated; however, in a preferred embodiment it is

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placed behind, i.e., on the side of the emulsion which is most distant from the photographed subject when the emulsion is exposed, and preferably also adapted to be most distant from the image-receiving element when in superposed relationship therewith. In carrying out the processes, the photosensitive element is exposed and wetted with a processing composition, for example, by immersing, coating, spraying, flowing, etc., in the dark, and the photosensitive element is superposed, prior to, during or after wetting, on an image-receiving element. In a preferred embodiment the processing composition contains a viscosity-increasing compound and is applied to the photosensitive element in a substantially uniform layer as the photosensitive element is brought into superposed position with the image-receiving element. The processing composition permeates the photosensitive emulsion and alkali-permeable layers and solubilizes the color-providing substances to provide a substantially uniform distribution of the color-providing substances therein. An imagewise distribution of mobile color-providing substances is formed in undeveloped areas as a function of development. At least a portion of the mobile color-providing substances is transferred to and imbibed on the dyeable stratum of the image-receiving element to form the transfer image. The image is viewed by stripping the image-receiving element from the photosensitive element.

Sometimes in the processes generally described above, the color-fastness of the transfer image, upon continued exposure to sunlight, leaves something to be desired. The present invention is concerned with providing means for protecting such images through the use of ultraviolet light absorbers, without requiring subsequent coating operations.

In accordance with this invention, protection against sunlight may be provided to the above-described color transfer images by supplying an ultraviolet light absorber to the liquid processing composition from which it is deposited on the image-receiving stratum along with the color-providing substances.

The ultraviolet light absorber may be initially placed in the processing composition itself or it may be placed in the photosensitive element and solubilized therefrom during processing. The ultraviolet light absorbers which are initially placed in the processing composition are preferably soluble in said processing composition and should be inert in any reactions to which the color-providing substances may be subjected, e.g., color coupling. The ultraviolet light absorbers should not be in a colored form at the final pH of the picture, and should be stable over an extended period of exposure to radiation. It is also preferable that the absorbers do not absorb appreciably in the visible range.

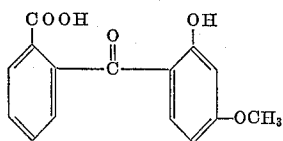
The permeation of the image-receiving layer by the color-providing substances may also be facilitated by incorporating mordants or dye precipitating agents in the dyeable stratum. When the color-providing substances are dye developers, oxidizing agents, such as benzoquinones, may be used to bring about precipitation.

In carrying out the preferred method of this invention, the photosensitive element containing a silver halide emulsion is exposed and wetted with a liquid processing composition and the photosensitive element superposed, prior to, during, or after said wetting, on the image-receiving element. The liquid processing composition permeates the emulsion and dissolves therefrom the color-providing substances. As the exposed silver halide emulsion is developed, an imagewise distribution of mobile color-providing substances is dissolved in the processing composition. At least a portion of the mobile color-providing substances is transferred by imbibition to the superposed image-receiving element. The ultraviolet light

absorber contained in the processing composition contacts the image-receiving stratum and a substantial portion of said absorber is deposited thereon, thereby providing protection from the deleterious effects of sunlight to the color image formed by the deposition of the color-providing substances in the image-receiving element. A non-image-wise distribution of ultraviolet light absorber is thus transferred to the image-receiving stratum from the processing composition. After completion of the imbibition period, the positive image which is now protected from the deleterious effects of sunlight, may be viewed by stripping the image-receiving element from the silver halide emulsion.

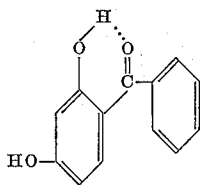
Ultraviolet light absorbers for use in this invention may be selected from the many compounds of this nature which are commercially available. The amount of ultraviolet light absorber used will vary with many factors such as the efficiency of the absorber itself, the original color fastness of the color-providing substances, and the amount of sunlight the transfer image will be exposed to during its life expectancy, etc. Generally, about 0.1–10% of ultraviolet light absorber based on the weight of the processing composition has been found effective in enhancing the color-fastness of the images. In a preferred embodiment, the ultraviolet light absorber is present in a level of about 0.5 to 5%, more preferably 0.5%. It should be understood that the actual upper limit of ultraviolet light absorber level will be determined to a great extent by the amount of color which the absorber imparts to the finished print. In view of the foregoing, the upper usable limit of some ultraviolet light absorbers in the liquid processing composition may be in excess of 10%.

As an example of a class of ultraviolet light absorbers which have been found to be especially useful in the processes and products of this invention, mention may be made of benzophenone type ultraviolet light absorbers. As examples of particularly useful ultraviolet light absorbers, mention may be made of:



2-hydroxy-4-methoxy-2'-carboxy benzophenone

sold by American Cyanamid Co., New York, New York, under the trade name "UV-207," and



2,4-dihydroxy-benzophenone

sold by Antara Chemicals (Division of General Aniline and Film Corporation), New York 14, N.Y., under the trade name "Uvinul 400."

While a great many ultraviolet light absorbers have been found suitable for use in this invention, the preferred class of ultraviolet light absorbers contain phenolic hydroxyls.

As stated above, ultraviolet light absorbers employed in the present invention may or may not be soluble in the alkaline photographic processing solutions. Preferably, alkali soluble ultraviolet light absorbers are used in order to provide for efficient permeation of the image-receiving sheet by said ultraviolet light absorber. If alkali insoluble ultraviolet light absorbers are used, care must be taken to provide for adhesion of said ultraviolet light absorber to the image-receiving stratum. When alkali insoluble ultraviolet light absorbers are used, a cosolvent such as methanol may be utilized in order to readily incorporate said absorbers into the processing compositions. It is de-

sirable, therefore, in selecting both alkali soluble and insoluble ultraviolet light absorbers to select those which have an affinity for the particular dyeable stratum which is to be used. It is believed that the ultraviolet light absorber transfers to the dyeable stratum before the color-providing substances, and that the ultraviolet light absorber occupies the mordant sites at or near the surface of the dyeable stratum, thereby providing a finished image-receiving element having a layer of ultraviolet absorber over the transfer color image. Occupying of the mordant sites at or near the surface by the ultraviolet light absorbers has the further important function of causing the image dyes to be deposited deeper within the image-receiving layer, thereby providing valuable additional protection against aerial oxidation or attack by materials in the atmosphere.

The image-receiving elements, on which the ultraviolet light absorber layers are deposited, generally comprise a sheet of dyeable material, e.g., baryta. In a preferred embodiment, such elements comprise a support which in turn has been coated with an image-receiving stratum of a dyeable material. As examples of dyeable materials which have been found useful for the image-receiving stratum, mention may be made of gelatin, a mixture of polyvinyl alcohol and polyvinyl pyrrolidone, copolymers of vinyl alcohol and vinyl pyrrolidone, and nylons (linear polyamides) such as N-methoxymethyl polyhexamethylene adipamide. The image-receiving sheet which comprises a layer of polyvinyl alcohol and poly-4-vinyl pyridine on a support, disclosed and claimed in the copending application of Howard C. Haas, Serial No. 50,848, now Patent No. 3,148,061, filed August 22, 1960, has been found to be particularly useful. The novel method of this invention for protecting color images has also been found to be particularly useful when used with the image-receiving elements set forth in the copending application of Edwin H. Land, Serial No. 234,864, filed November 1, 1962, wherein the image-receiving element contains a layer of a polymeric acid.

The products and processes of this invention are especially useful when dye developers are the color-providing substances. Dye developers, as noted above, are compounds which contain in the same molecule both the chromophoric system of a dye and also a silver halide developing function. By "a silver halide developing function" is meant a radical which is capable of developing an exposed silver halide image. In a preferred embodiment, the silver halide developing function in such compounds is provided by the presence of a benzenoid developing radical therein, e.g., a hydroquinonyl radical. Examples of representative dye developers are given in the previously mentioned U.S. Patent No. 2,983,606.

In color diffusion transfer processes employing dye developers, the dye developer, as mentioned previously for color-providing substances, in general, is preferably placed in a separate alkali-permeable layer behind the photosensitive layer. Upon processing, the processing composition permeates to the separate alkali-permeable layer and solubilizes the dye developer therefrom. As the process proceeds, the latent silver halide image in the photosensitive element is developed and, as a result of this development, the dye developer in the exposed areas is oxidized and substantially immobilized. At least a portion of the unreacted dye developer is imbibed on a superposed image-receiving element to create thereon the positive dye image. In such processes, the immobilization of the dye developers in the exposed areas is apparently due, at least in part, to a change in the solubility characteristics of the dye developer upon oxidation. It may also be due in part to a tanning effect on the emulsion by the oxidized developer and to localized exhaustion of alkali due to development.

It has also been found, unexpectedly that the ultraviolet absorbers, as used within the scope of this invention, act like antifoggants under certain circumstances. It is pos-

sible, therefore to use less antifoggant in processing compositions within the scope of this invention.

The copending application of Samuel Dershowitz, Serial No. 247,868, filed concurrently herewith, discloses and claims the use of glucosides of phenolic hydroxyl compounds to lessen the degree of fading in color prints. It has now been found that a greater degree of protection is achieved in color prints when a glucoside of a phenolic hydroxyl compound, preferably arbutin, is also added to the processing composition containing the ultraviolet absorber.

The liquid processing compositions suitable for use in this invention may also contain, as well as an alkaline material, e.g., sodium hydroxide, cesium hydroxide or potassium hydroxide, a dye developer, and, in some instances may also contain an additional silver halide developing agent. A viscosity-increasing compound constituting a film-forming material may also be added to facilitate spreading. A preferred film-forming material is a high molecular weight polymer, such as a polymeric, water-soluble ether inert to an alkali solution, as, for example, a hydroxyethyl cellulose or sodium carboxymethyl cellulose. The film-forming materials or thickening agents whose ability to increase viscosity is substantially unaffected when left in solution for a long period of time may also be used. The liquid processing composition may also contain antifoggants, e.g., benzotriazole, and quaternary ammonium compounds, e.g., N-phenethyl- α -picolinium bromide, N-benzyl- α -picolinium bromide, as disclosed in the copending application of Milton Green and Howard G. Rogers, Serial No. 50,851, filed August 22, 1960, now U.S. Patent No. 3,173,786.

The following nonlimiting examples illustrate novel processing compositions within the scope of this invention.

Example 1

	Percent
Sodium hydroxide	5.17
Hydroxyethyl cellulose	4.5
Benzotriazole	2.3
N-benzyl- α -picolinium bromide	2.3
Sodium thiosulfate	1.15
2,4-dihydroxy-benzophenone	2.5

Example 2

Sodium hydroxide	5.17
Hydroxyethyl cellulose	4.5
Benzotriazole	2.3
N-benzyl- α -picolinium bromide	2.3
Sodium thiosulfate	1.15
2-hydroxy-4-methoxy-2'-carboxy-benzophenone	5.0

Example 3

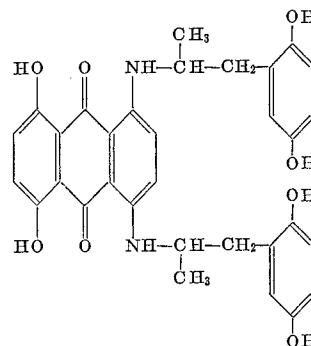
Sodium hydroxide	5.17
Hydroxyethyl cellulose	4.5
Benzotriazole	2.3
N-benzyl- α -picolinium bromide	2.3
Sodium thiosulfate	1.15
2-hydroxy-4-methoxy-2'-carboxy-benzophenone	5.0
Arbutin	2.0

The novel processing compositions of this invention were tested in diffusion transfer processes on multilayer photosensitive elements prepared in the manner similar to that disclosed in the above-mentioned U.S. Patent No. 2,983,606 and in the above-mentioned copending application of Edwin H. Land and Howard G. Rogers, Serial No. 565,135, filed February 13, 1956, and image-receiving elements which comprise a layer of polyvinyl alcohol and poly-4-vinyl pyridine on a support, prepared in the manner similar to that disclosed and claimed in the above-mentioned copending application of Howard C. Haas, Serial No. 50,848.

In the examples set forth below, reference to a multicolor negative is to a multilayer negative in which the

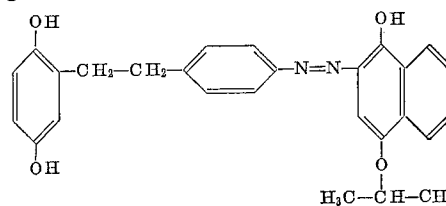
blue-sensitive, green-sensitive, and red-sensitive silver iodobromide emulsion layers have positioned behind them, respectively, a yellow dye developer, a magenta dye developer, and a cyan dye developer. A gelatin interlayer is positioned between the yellow dye developer layer and the green-sensitive emulsion, and between the magenta dye developer and the red-sensitive emulsion. Multilayer negatives of this type are disclosed, for example, in FIG. 9 of the previously mentioned U.S. Patent No. 2,983,606. The dye developer layers are prepared by dissolving each dye developer in a water-immiscible solvent and dispersing the resulting solution in a gelatin. The particular dye developers employed were:

Cyan:



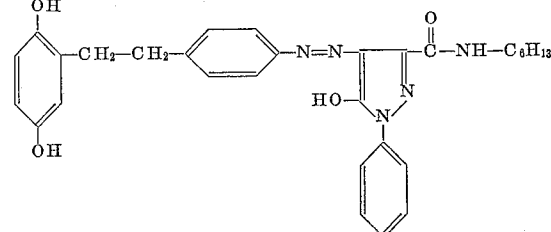
1,4-bis[α -methyl- β -hydroxyquinonyl-ethylamino]-5,8-dihydroxyanthraquinone

Magenta:



2-[p-(2',5'-dihydroxyphenethyl)-phenylazo]-4-isopropoxy-1-naphthol

Yellow:



1-phenyl-3-N-n-hexylcarbonyl-4-[p-(2',5'-dihydroxyphenethyl)-phenylazo]-5-pyrazolone

The effectiveness of the novel processing compositions of this invention in providing protection to color images was measured by exposing a multilayer, multicolor negative as described above, and by spreading a thin layer of processing composition between the above-mentioned image-receiving element and said exposed multicolor negative as they were brought into superposed relationship. After an imbibition period of 1½ minutes, the image-receiving element was separated from the negative. The positive image was then subjected to accelerated fading tests along with control positive prints, i.e., images formed with comparable liquid processing compositions which do not contain ultraviolet light absorbers.

The accelerated fading test may be described as follows: The positive color prints under test were mounted under glass, and positioned three inches from the glass, the glass being positioned at an angle of 45° to the horizontal and facing south. In this manner, the prints were exposed on the Florida seacoast on a 24 hour basis for the period necessary to record the desired number of gram-

calories per square centimeter (Langley's) of solar radiation, as recorded by an Epply Pyrheliometer (made by the Epply Laboratory, Inc., Newport, R.I.) as the sensing unit. An evaluation of the effectiveness was then made by comparing the degree of magenta fading of a control sample with one that had been protected by ultraviolet light absorbers applied from the processing compositions.

It was found that the magenta component of color image formed on the image-receiving element disclosed in the above-mentioned application Serial No. 50,848 that had been processed with a liquid processing solution identical to that of Example 1 but which does not contain the ultraviolet light absorber, i.e., a control sample, after exposure to 700 Langley's faded 51%; 1400 Langley's, 62%; and 2450 Langley's, 89%; whereas the magenta component of a color image which was prepared using the same dyes and the processing composition of Example 1 showed only 29% fading after exposure to 700 Langley's, 29% after 1400 Langley's, and 58% after 2450 Langley's. The magenta component of a color image processed with the processing solution of Example 2 showed 43% fading after 700 Langley's, 51% after 1400 Langley's, and 73% after 2450 Langley's. The magenta component of a color image processed with the processing solution of Example 3 showed 28% fading after 700 Langley's, 35% after 1400 Langley's, and 59% after 2450 Langley's.

It can be readily seen, therefore, that a substantial degree of protection can be provided to color images by means of the present invention, even when the color images are subjected to such an intensive and severe test as the above-described sunlight exposure test.

Example 3 above illustrates the use of both a glucoside of a phenolic hydroxyl compound and an ultraviolet light absorber in the processing composition. It has now been found that it is particularly advantageous to use a processing composition containing a glucoside of a phenolic hydroxyl compound and an ultraviolet light absorber when processing an image-receiving element wherein the image-receiving layer contains a layer of a polymeric acid, e.g., a half-butyl ester of poly(ethylene/maleic anhydride), the anhydride copolymer being commercially available from Monsanto Chemical Co., St. Louis, Missouri, under the trade name DX-840-31 Resin. Such image-receiving elements are set forth in the above-mentioned copending application of Edwin H. Land, Serial No. 234,864, filed November 1, 1962. The use of an ultraviolet light absorber and a glucoside of a phenolic hydroxyl in the processing composition is disclosed and claimed in my copending application, Serial No. 247,864, filed concurrently herewith. An example of a processing composition containing an ultraviolet light absorber and a glucoside of a phenolic hydroxyl compound is:

Example 4

Water, cc. -----	100
Hydroxyethyl cellulose (high viscosity) [commercially available from Hercules Powder Co., Wilmington 99, Delaware, under the trade name Natrosol 250], g. -----	4.03
Sodium hydroxide, g. -----	5.17
Potassium hydroxide, g. -----	3.75
Benzotriazole, g. -----	2.3
Cesium hydroxide, g. -----	0.5
N-benzyl- α -picolinium chloride, g. -----	1.5
Arbutin, g. -----	2.0
2-hydroxy-4-methoxy-2'-carboxybenzophenone, g. -	2.0

Accelerating fading tests of multicolor images using processing composition No. 4 with the above-described polymeric acid layer-type receiving element (using the same image receiving layer as in the previous tests) showed 16% magenta fading after 700 Langley's and 17% magenta fading after 1400 Langley's.

The ultraviolet light absorber may also be transferred from the processing composition to a polymeric layer positioned over the image-receiving layer. In carrying out this embodiment of the invention, the polymeric layer comprises a thin layer which is substantially non-dyeable by the color-providing substances but which has a preferential affinity for the ultraviolet light absorber. The copending application of Howard G. Rogers, Serial No. 242,066, filed December 4, 1962, discloses and claims an image-receiving element comprising a very thin layer of polyvinyl alcohol over the image-receiving layer. It is believed that the polyvinyl alcohol layer of the above-noted application, Serial No. 242,066 is not dyed by the color-providing substances because the underlying image-receiving layer containing mordant sites for said color-providing substances has a greater affinity for said color-providing substances; photomicrographs of cross-sections of such image-receiving elements used with dye developers show that the layer of polyvinyl alcohol was free of dye. By utilizing a polymeric layer adapted to mordant the ultraviolet light absorber, the color-providing substances transfer through said polymeric layer without adhering thereto, while the ultraviolet light absorber is deposited on said polymeric layer, thereby providing a protective layer of ultraviolet light absorber over the color image.

In another mode of carrying out this invention, an ultraviolet light absorber is supplied to the processing solution and deposited along with the color-providing substances on the image-receiving stratum. Thus, the ultraviolet light absorber may be initially placed in the processing solution itself, as described above, or it may be placed in the photosensitive element and solubilized therefrom during processing. The ultraviolet light absorbers used in this mode of the invention should be soluble in the aqueous alkaline processing compositions and should be inert to any reactions to which the color-providing substances may be subjected, e.g., color coupling.

When the ultraviolet light absorbers are initially disposed in the photosensitive elements, they may be incorporated in various positions throughout such elements. In a preferred embodiment, the ultraviolet light absorber is incorporated in a separate alkali-permeable layer along with the color-providing substances. Upon processing, the ultraviolet light absorber is solubilized by the processing solution and transferred along with the image-wise distribution of color-providing substances to the image-receiving layer.

In another useful embodiment, the ultraviolet light absorber is disposed in a separate alkali-permeable layer apart from the color-providing substance in the photosensitive element. The layer bearing the ultraviolet light absorber is preferably placed behind the layer containing the color-providing substances so that during processing the ultraviolet light absorber will be dissolved after the color-providing substances and tend to be deposited over them on the image-receiving stratum. In a further embodiment, the separate alkali-permeable layer containing the ultraviolet absorber may be applied over the photosensitive emulsion. This embodiment is especially useful when an ultraviolet light absorber is used which has a lower rate of mobility than the color-providing substance. This embodiment is particularly advantageous in that the ultraviolet light absorber layer can perform other useful functions in addition to protecting the transferred color-providing substance. One such function would be to act as a haze filter and antiabrasion coat for the photosensitive emulsion. Another such function would be to decrease the effect of ultraviolet light on blue-sensitive emulsions when such emulsions have excessive ultraviolet sensitivity. It would be further useful in multicolor, multilayer, photosensitive elements and especially in those wherein a yellow filter is placed behind a blue-sensitive emulsion and it is desirable to cut down the amount of ultraviolet light transmitted to the red

and green layers. In a still further embodiment, an ultraviolet light absorber may be placed in the photosensitive emulsion stratum. Since in some cases ultraviolet light absorbers may tend to desensitize the photosensitive material, suitable precautions should be taken in selecting the absorber to be so used.

In still another embodiment, a transparent image-receiving element is employed and an ultraviolet light absorber is disposed in the supporting stratum of said element. Upon processing, the color-providing substances are transferred to the dyeable stratum of the image-receiving element and an opaque background, preferably white, is provided behind the dyeable stratum so that the transfer image is viewed through the support by reflection. The opaque background behind the dyeable stratum may be provided by various methods. As an example of one such method, mention may be made of a thin, permeable layer, e.g., containing a white pigment such as titanium dioxide, located over the dyeable stratum and through which the color-providing substances diffuse to the dyeable stratum. Use also may be made of the processes disclosed in U.S. Patent No. 2,647,056, wherein an opacifier is incorporated in the viscous processing solution and the processing solution is adapted so as to preferentially adhere to the image-receiving stratum. Another mode of providing an opaque background comprises incorporating a material in the processing solution and another material on the surface of the image-receiving stratum which, when reacted with the former material, produces an opaque product. An example of this method may be found in U.S. Patent No. 2,607,685, wherein sodium carbonate is used in the processing solution and zinc hydroxide is incorporated in the image-receiving stratum. It should be understood that the opacifiers or opacifying reagents may be incorporated in separate processing solutions which are distinct from those used to process the photographic image. When it is desirable to use such separate solutions, film units which contain a plurality of rupturable reagent containers, such as those disclosed in the above-mentioned U.S. Patent No. 2,607,685, may be employed. In a further mode of providing an opaque background, the image-receiving element may be superposed on and adhered to an opaque sheet after processing.

The images produced in the above embodiment will appear reversed when viewed through the support. In most instances this reversal will not be objectional but, if it is desirable to remedy it, one may use a camera which contains an odd number of mirrors in the focal path between the lens and the photosensitive element. Examples of such cameras may be found in U.S. Patent No. 2,834,269.

In cases where the ultraviolet light absorbers exhibit color changes in an alkaline medium, provisions may be made to provide that the image-receiving element, after processing, will have a suitable pH to render such ultraviolet light absorber substantially colorless. One such provision would be to use a volatile alkaline material in the processing composition so that after processing it would volatilize from the image-receiving element and reduce the pH of said element. As examples of volatile alkaline materials, mention may be made of diethylamine, ethylamine, ethanolamines, etc. Another useful provision which may be used would be to incorporate an acid into the image-receiving element which would neutralize any alkaline material which may be deposited thereon during processing. As examples of suitable acids, mention may be made of citric acid, oxalic acid, etc. The previously mentioned image-receiving elements containing a layer of a polymeric acid, as disclosed and claimed in the copending application of Edwin H. Land, Serial No. 234,864, filed November 1, 1962, are particularly effective in controlling the final pH of the transfer image.

A particularly useful class of ultraviolet absorbers are those which are phototropic, i.e., ultraviolet absorbers which are substantially colorless when not absorbing ul-

traviolet radiation and which are activated when strongly irradiated by ultraviolet radiation. Although such phototropic ultraviolet absorbers may become colored when activated by strong ultraviolet radiation, they revert to the colorless form when such radiation is removed.

The novel processing compositions of this invention are especially useful in composite roll film units intended for use in a "Polaroid Land Camera," sold by Polaroid Corporation, Cambridge 39, Massachusetts, or a similar camera structure such, for example, as the camera forming the subject matter of U.S. Patent No. 2,435,717, issued to Edwin H. Land on February 10, 1948. In general, such composite roll film units comprise a photosensitive roll, a roll of image-receiving material and a plurality of pods containing a liquid processing composition. The rolls and pods are so associated with each other that, upon processing, the photosensitive element may be superposed on the image-receiving element and the pods may be ruptured to spread the liquid processing composition between the superposed elements. The nature and construction of the pods used in such units are well known to the art. See, for example U.S. Patents Nos. 2,543,181 and 2,634,886, issued to Edwin H. Land.

Since certain changes may be made in the above product and process without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A process for applying an ultraviolet light absorber to a transfer image in a diffusion transfer process, said process comprising the steps of permeating an exposed photosensitive element, including a silver halide emulsion, with a liquid processing composition, providing said processing composition with an ultraviolet light absorber soluble therein, developing said exposed emulsion and forming, as a function of development, an imagewise distribution of a mobile color-providing substance selected from the group consisting of dyes and dye intermediates, and transferring at least a portion of said ultraviolet light absorber and of said mobile color-providing substance to a superposed image-receiving layer, the amount of said transferred ultraviolet light absorber being in a concentration effective to reduce fading of said transfer image upon exposure to sunlight.

2. A process as defined in claim 1, wherein said ultraviolet light absorber is contained in an alkali-permeable layer in said photosensitive element and is supplied to the processing composition by being dissolved from said alkali-permeable layer by said processing composition during permeation.

3. A process as defined in claim 1, wherein said ultraviolet light absorber is initially contained in the liquid processing composition.

4. A process as defined in claim 1, wherein said ultraviolet light absorber is placed in an alkali-permeable polymeric stratum of the image-receiving material and is transferred to the image-receiving layer by said processing composition.

5. A process as defined in claim 3, wherein said ultraviolet light absorber is present in a range of 0.1 to 10% by weight.

6. A process as defined in claim 1, wherein said ultraviolet light absorber is 2-hydroxy-4-methoxy-2'-carboxy benzophenone.

7. A process as defined in claim 1, wherein said ultraviolet light absorber is 2,4-dihydroxybenzophenone.

8. A process as defined in claim 7, wherein said 2,4-dihydroxybenzophenone is in said composition at a level of 2.5% by weight.

9. A photographic product for color diffusion transfer process comprising (A) a photosensitive element, including a silver halide emulsion, having disposed therein color-providing substances selected from the group consisting

of dyes and dye intermediates, said color-providing substances being adapted to form an imagewise distribution of mobile color-providing substances as a function of development of the silver halide emulsion, (B) an image-receiving element, and (C) a rupturable container holding a liquid processing composition, said elements being capable of being superposed, and said container being associated with said elements in such a manner that the container, upon being ruptured, is capable of releasing said processing composition between said superposed elements, said image-receiving element comprising a support stratum bearing in turn a dyeable image-receiving stratum, said processing composition having an ultraviolet light absorber disposed therein, said photosensitive element having a substantially lower affinity for said ultraviolet light absorber than the material of said dyeable image-receiving stratum.

10. A product as defined in claim 9 wherein said ultraviolet light absorber is a benzophenone.

11. A product as defined in claim 9, wherein said ultraviolet light absorber is present in a range of 0.1 to 10% by weight.

12. A product as defined in claim 9, wherein said ultraviolet light absorber is 2-hydroxy-4-methoxy-2'-carboxy benzophenone.

13. A product as defined in claim 9, wherein said ultraviolet light absorber is 2,4-dihydroxybenzophenone.

14. A product as defined in claim 13, wherein said 2,4-dihydroxybenzophenone is 2.5% by weight of said composition.

15. The process which comprises the steps of permeating an exposed photosensitive element, including a silver halide emulsion, with an alkaline liquid processing com-

position, providing said composition with an ultraviolet light absorber, developing said exposed emulsion and forming an imagewise distribution of an unoxidized dye developer, and transferring at least a portion of said ultraviolet light absorber to a superposed image-receiving element, said image-receiving element containing a layer adapted to provide a visible dye image upon transfer to said layer of a diffusible dye image-forming substance, the amount of said transferred ultraviolet light absorber being in concentration effective to reduce fading of said transferred dye image upon exposure to sunlight.

16. A process as defined in claim 15, wherein said ultraviolet light absorber is 2,4-dihydroxybenzophenone and is present in said composition at 2.5% by weight of said composition.

17. In a process of forming a color image by diffusion transfer, wherein an imagewise distribution of a dye image-providing substance selected from the group consisting of image dyes and intermediates for said image dyes is transferred by means of an alkaline processing composition from a developed photosensitive stratum to a superposed image-receiving stratum, the step which comprises depositing from said processing composition onto said image-receiving layer an ultraviolet light absorber in a concentration effective to reduce fading of said image dye upon exposure to sunlight.

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NORMAN G. TORCHIN, *Primary Examiner.*