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2,857,274

PHOTOGRAPHIC COMPOSITIONS AND PROCESSES

Edwin H. Land, Cambridge, Elkan R. Blout, Belmont, Saul G. Cohen, Lexington, Milton Green, Mattapan, Helen J. Tracy, Boston, and Robert B. Woodward, Belmont, Mass., assignors to Polaroid Corporation, Cambridge, Mass., a corporation of Delaware

No Drawing. Application September 4, 1953 Serial No. 378,684

18 Claims. (Cl. 96—29)

The present invention relates to photography and more particularly to photographic compositions, processes and products.

Photographic processing compositions capable of forming water-soluble, complex silver salts are known to be useful in many phases of silver halide photography. In particular, a photographic composition which includes a silver halide developer as well as a silver complexing agent is useful in processing a silver halide element by reducing its exposed silver halide to silver, by reacting with its unreduced silver halide to form a water-soluble, complex silver salt and by transferring the salt to an image-receptive element, there to form a visible image.

The silver complexing agents of the prior art have various shortcomings with respect to transfer processes of this type. For example: certain complexing agents, e. g., ammonia, are too weak to be effective in the production of transfer images; others, e. g., sodium thiosulfate, leave on the transfer image a harmful sulfur residue; and still others, e. g., sodium cyanide, are often impractical because of their dangerous toxicity.

Objects of the present invention are to provide compositions, processes and products related to a novel association of complexing agents which together are unusually adapted to react with silver halide to form water-soluble silver salts.

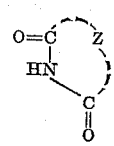
Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation and order of one or more such steps with respect to each of the others, and the composition and 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 predicated upon the discovery that soluble, complex silver salts, useful, for example, in the production of transfer images, may be formed by reacting silver halide, in alkaline aqueous solution, with two associated complexing agents, the first of which is a cyclic imide and the second of which is a nitrogenous base. It has been found unexpectedly that two such associated complexing agents, together, are more effective in the production of transfer images than is either, individually.

Preferred cyclic imides to be employed, in accordance with the present invention, are characterized by the following general formula:

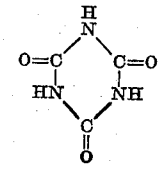


wherein Z represents (1) atoms of a series completing

a cyclic imide nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from the atoms of the series, at least one of the members being selected from the class consisting of hydrogen atoms, amino radicals and aliphatic radicals containing from 1 to 4 carbon atoms, at most one of the members being selected from the class consisting of halogen atoms, keto oxygen atoms and aromatic radicals. Although the foregoing formula is in keto form, it is intended to encompass the enolic modifications of compounds within its scope.

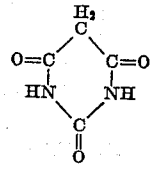
Typical preferred cyclic imides, corresponding to the foregoing general formula, are triazines, barbiturates, uracils, urazoles, hydantoins, glutarimides, glutaconimides, succinimides, maleimides, and quaternary ammonium salts, examples of which follow:

(1)



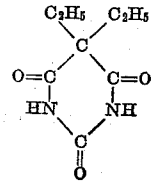
Cyanuric acid

(2)



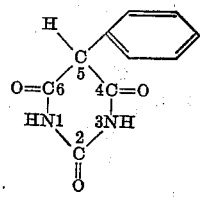
Barbituric acid

(3)



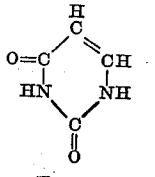
Diethyl barbituric acid

(4)



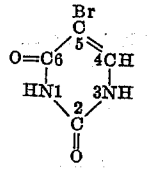
5-phenyl barbituric acid

(5)



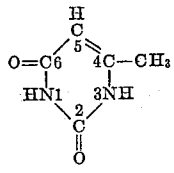
Uracil

(6)



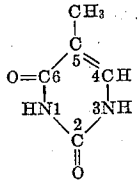
5-bromo uracil

(7)



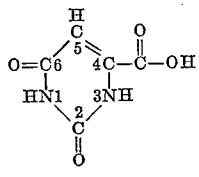
4-methyl uracil

(8)



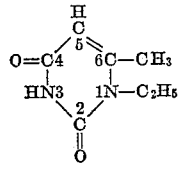
5-methyl uracil

(9)



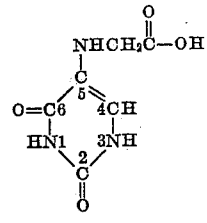
4-carboxy uracil

(10)



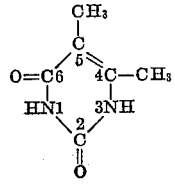
1-ethyl-6-methyl uracil

(11)



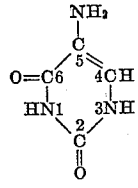
5-carboxymethyl amino uracil

(12)



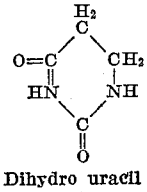
4,5 dimethyl uracil

(13)



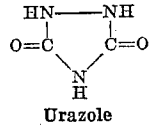
5-amino uracil

(14)



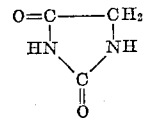
Dihydro uracil

(15)



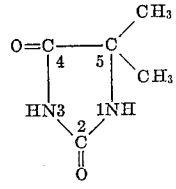
Urazole

(16)



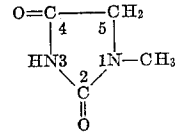
Hydantoin

(17)



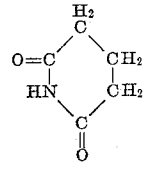
5,5 dimethyl hydantoin

(18)



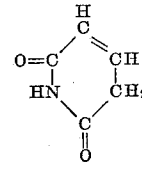
1-methyl hydantoin

(19)



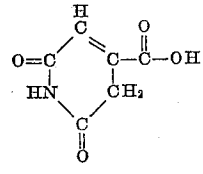
Glutarimide

(20)



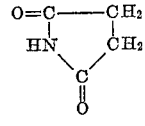
Glutaconimide

(21)



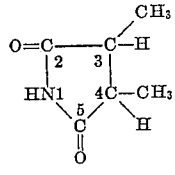
Citrazinic acid

(22)



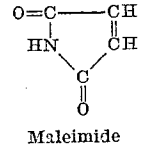
Succinimide

(23)



3,4 dimethyl succinimide

(24)



Maleimide

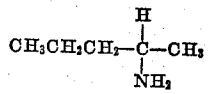
Of the great variety of nitrogenous bases to be employed in accordance with the present invention, preferred complexing agents are nitrogenous bases which are soluble in aqueous alkali and which are selected from the class consisting of ammonia, amines, hydroxylamine, ali-

phatic hydroxylamines, hydrazine and aliphatic hydrazines. Typical preferred nitrogenous bases are:

(1) NH_3

Ammonia

(2)



Sec. amylamine

(3) $C_2H_5NH_2$

Ethylamine

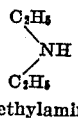
(4) $CH_3CH_2CH_2CH_2NH_2$

n-Butylamine

(5) $CH_2=CH-CH_2-NH_2$

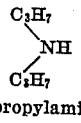
Allylamine

(6)



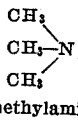
Diethylamine

(7)



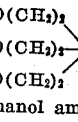
Dipropylamine

(8)



Trimethylamine

(9)



Triethanol amine

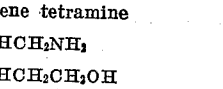
(10) $NH_2CH_2CH_2NHCH_2CH_2NH_2$

Diethylene triamine

(11) $NH_2-(CH_2CH_2NH)_2CH_2CH_2NH_2$

Triethylene tetramine

(12)



N-hydroxyethyl propylene diamine

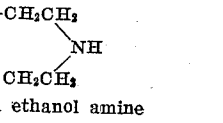
(13) $NH_2-CH_2CH_2CH_2NH_2$

Trimethylene diamine

(14) $NH_2CH_2CH_2NH_2$

Ethylene diamine

(15)



Aminoethyl ethanol amine

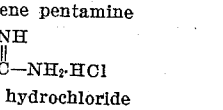
(16) $HOCH_2CH_2NHCH_2CH_2NHCH_2CH_2NH_2$

Hydroxyethyl diethylene triamine

(17) $NH_2(CH_2CH_2NH)_3CH_2CH_2NH_2$

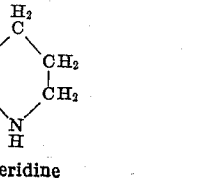
Tetraethylene pentamine

(18)



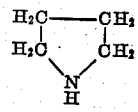
Guanidine hydrochloride

(19)



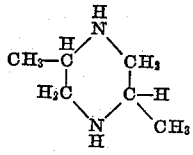
Piperidine

(20)



Pyrrolidine

(21)

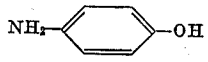


2,5 dimethyl piperazine

(22) $[-C_2H_4NH-]_n$

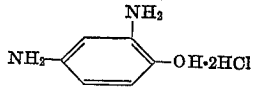
Polyethylene imine

(23)



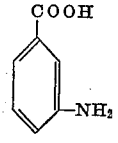
p-Aminophenol

(24)



2,4-diaminophenol dihydrochloride

(25)



Meta-amino-benzoic acid

(26) NH_2-NH_2

Hydrazine

(27) CH_3NH-NH_2

Methyl hydrazine

(28) $CH_3NH-NHCH_3$

Symmetrical dimethyl hydrazine

(29) $(CH_3)_2N-NH_2$

Unsymmetrical dimethyl hydrazine

(30) $NH_2OH \cdot HCl$

Hydroxylamine hydrochloride

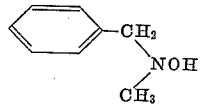
(31)

N,N diethyl hydroxylamine

(32) C_2H_5NHOH

Ethyl hydroxylamine

(33)

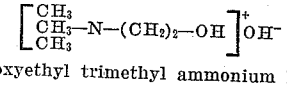


Methyl benzyl hydroxylamine

(34) H_2NOCH_3

O-methyl hydroxylamine

(35)



β hydroxyethyl trimethyl ammonium hydroxide

In a photographic composition embodying the present invention by total weight the concentration of the cyclic imide preferably ranges from 1 to 25% and the concentration of the nitrogenous base preferably ranges from .15 to 15%. The alkalinity of the solution preferably is high, ranging from a pH of 11 to a hydroxyl ion concentration of 5 N. The cyclic imide and the nitrogenous base preferably are sulfur free.

As examples of bases which are capable of imparting an appropriate alkalinity to the composition, mention may be made of alkali-metal hydroxides such as sodium and potassium hydroxide and amines such as diethylamine and

allylamine. Such a nitrogenous base as diethylamine can perform, at once, both this function and a complexing function.

A composition embodying the present invention is broadly useful in a variety of photographic processes of the type in which water-soluble silver complexes are formed from the unreduced silver halide of a photoexposed and at least partially developed silver halide element. A composition embodying the present invention specifically suitable for use in the production of transfer images comprises, in addition to associated complexing agents of the above-described type, a suitable silver halide developer, preferably organic, such as hydroquinone, chlorohydroquinone, bromohydroquinone, dichlorohydroquinone, toluhydroquinone, metol, glycin, p-aminophenol hydrochloride, pyrocatechin, pyrogallol and ascorbic acid. Such a nitrogenous base as p-aminophenol can perform, at once, both a developing function and a complexing function.

In one such transfer process, the composition is spread in a uniformly thin layer between the superposed surfaces of a photoexposed gelatino silver halide element and an image-receptive element, for example, by advancing the elements between a pair of pressure-applying rollers. The elements are maintained in superposed relation for a predetermined period, preferably of the order of 40 to 120 seconds in duration, during which exposed silver halide is reduced to silver and unreduced silver halide forms a water-soluble, complex salt which diffuses through the layer of composition to the image-receptive element, there to be reduced to silver and to form a visible print. At the end of this period, the silver halide element is stripped from the image-receptive element. Materials useful in one such transfer process are described in U. S. Patent No. 2,543,181, issued in the name of Edwin H. Land, on February 27, 1951, for Photographic Product Comprising a Rupturable Container Carrying a Photographic Processing Liquid.

The image-receptive element, preferably, includes certain materials the presence of which, during the transfer process, has a desirable effect on the amount and character of silver precipitated on the image-receptive element. Materials of this type are specifically described in copending U. S. patent applications Serial No. 727,385, filed by Edwin H. Land on February 8, 1947, for Photographic Product and Process and Serial No. 164,908, filed by Edwin H. Land on May 29, 1950, for Photographic Silver Halide Product and Process.

A composition employed in the foregoing manner preferably is relatively viscous, of the order of 100 to 200,000 centipoises at a temperature of 20° C., so as to be easily controlled when spread. If desired, the viscosity of the composition can be increased by including within it a suitable thickening agent, such, for example, as a water-soluble synthetic polymer, an insoluble, emulsifiable oil, a starch, or a gum. It is possible that such a nitrogenous base as polyethylene imine performs, at once, both a thickening function and a complexing function.

It is often desirable to confine a composition of the present invention within a hermetically sealed container which is ruptured and discharges its contents upon advancing between a pair of pressure-applying rollers of the foregoing type. Such a container, for example, may be constructed from a bank of three-ply sheet material having a single fold. The outer ply serves as a backing or support and is composed of a thin, relatively inexpensive, tough material, preferably a paper such as kraft paper. The intermediate ply is composed of a substantially vapor-, liquid-impervious material, for example a metal foil such as lead foil. The inner ply is composed of a thermoplastic or thermosetting plastic material, for example a polyvinyl acetal such as polyvinyl butyral or polyvinyl formal which protects the container contents from contamination. A composition comprising by weight approximately 60% to 70% polyvinyl butyral, approximately 10% to 23% nitrocellulose and approximately 5% dibutyl sebacate is particularly satisfactory. At opposite end portions of each container, the two folds of the inner ply are sealed to each other as by the application of heat and pressure. Those two sections of the two folds defining the mouth are bonded together by a strip of adhesive which is so constituted that the adhesive forces between the strip and the inner ply are less than the cohesive forces between end portions of the inner ply which are sealed together. A satisfactory strip may be composed, for example, of ethyl cellulose or a mixture of ethyl cellulose and paraffin, the mixture including at least 50% by weight of ethyl cellulose. Since the bonding forces between those sections defining the mouth are less than the bonding forces between other sections of the container, the application of opposed compressional forces to the container causes discharge of the container contents through its mouth.

Stripping of the silver halide element from the image-receptive element may separate the layer of processing composition from the image-receptive element or may permit the layer of processing composition to remain in contact with the image-receptive element in order to form a protective coating. Techniques which enable such stripping to be accomplished as desired are taught in copending U. S. Patent No. 2,647,056, issued to Edwin H. Land on July 28, 1953, for One Step Photographic Transfer Process. Where the processing composition employs a volatile nitrogenous base, i. e., a low molecular weight aliphatic amine, as one of its associated complexing agents, it is particularly effective as a protective coating since evaporation of the volatile amine from the protective coating decreases the tendency of the silver image on the image-receptive element to reform a silver complex. Furthermore, if the associated complexing agents and developer are judiciously chosen, the reaction product residue of the composition and silver halide will remain substantially colorless when present on the silver image either as a trace remaining after the processing composition layer has been separated from the silver image or within the protective coating formed when the processing composition has been permitted to remain upon the silver image.

There now follow examples of compositions, embodying the present invention, which are suitable for use in transfer processes of the foregoing type:

Example 1

Water	cc..	400
Sodium carboxymethyl cellulose (high viscosity)	gr..	14.4
Sodium hydroxide	gr..	30.2
Sodium sulfite	gr..	25.6
Barbituric acid	gr..	36.0
Hydroquinone	gr..	4.3
Metol	gr..	0.05
Aminoethyl ethanol amine	cc..	9.0

Example 2

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by an equal quantity of triethylene tetramine.

Example 3

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by an equal quantity of guanidine hydrochloride.

Example 4

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by 13.5 cc. of ammonium hydroxide (28%).

Example 5

The formula of Example 1 except that the aminoethyl

ethanol amine is replaced by an equal quantity of allylamine.

Example 6

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by 3.0 cc. of sec. amylamine.

Example 7

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by 18.0 cc. of piperidine.

Example 8

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by 18.0 cc. of pyrrolidine.

Example 9

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by 4.5 cc. of trimethylene diamine.

Example 10

The formula of Example 1 except that the aminoethyl ethanol amine is replaced by 18.0 cc. of n-hydroxyethyl propylene diamine.

Example 11

The formula of Example 1 except that the barbituric acid is replaced by an equal quantity of sodium barbital.

Example 12

The formula of Example 1 except that the barbituric acid is replaced by an equal quantity of cyanuric acid.

Example 13

The formula of Example 1 except that the barbituric acid is replaced by an equal quantity of urazole.

Example 14

The formula of Example 1 except that the barbituric acid is replaced by an equal quantity of uracil.

Example 15

The formula of Example 1 except that the barbituric acid is replaced by an equal quantity of hydantoin.

Example 16

The formula of Example 1 except that the barbituric acid is replaced by an equal quantity of carboxymethyl barbituric acid.

Example 17

The formula of Example 1 except that the barbituric acid is replaced by an equal quantity of 4-carboxy uracil.

Example 18

The formula of Example 1 except that the hydroquinone is replaced by 1.8 gr. of amidol.

Example 19

The formula of Example 1 except that the hydroquinone is replaced by 1.8 gr. of metol.

Example 20

Water	cc.	88.5
Sodium carboxymethyl cellulose (high viscosity)	gr.	4.0
Sodium hydroxide	gr.	8.0
Sodium sulfite	gr.	2.5
Glycin	gr.	4.0
Uracil	gr.	10.0
Ethylamine/water—80%/20%	cc.	1.75

Example 21

The formula of Example 20 except that the ethylamine/water is replaced by 2.0 cc. of trimethylamine/water—25%/75%.

Example 22

The formula of Example 20 except that the ethylamine/water is replaced by 1.0 gr. of p-aminophenol.

Example 23

The formula of Example 20 except that the ethylamine/water is replaced by 0.5 gr. of diaminophenol dihydrochloride.

Example 24

The formula of Example 20 except that the ethylamine/water is replaced by 1.0 gr. of m-amino benzoic acid.

Example 25

The formula of Example 20 except that the ethylamine/water is replaced by 0.8 gr. of triethanol amine.

Example 26

The formula of Example 20 except that the ethylamine/water is replaced by 6 cc. of hydrazine hydrate.

Example 27

The formula of Example 20 except that the ethylamine/water is replaced by 3.0 gr. methyl hydrazine sulfate.

Example 28

The formula of Example 20 except that the ethylamine/water is replaced by 1.5 gr. symmetrical dimethyl hydrazine dihydrochloride.

Example 29

The formula of Example 20 except that the ethylamine/water is replaced by 1.5 gr. unsymmetrical dimethyl hydrazine dihydrochloride.

Example 30

The formula of Example 20 except that the ethylamine/water is replaced by 4.0 gr. of hydroxylamine hydrochloride.

Example 31

The formula of Example 20 except that the ethylamine/water is replaced by 2.0 gr. of methyl benzyl hydroxylamine.

In preparing the foregoing compositions, the carboxymethyl cellulose and the sodium hydroxide first were dissolved in the water at room temperature. Next, the sodium sulfite was dissolved in the solution. Thereafter, the cyclic imide was added to the solution and the two phases were mixed until the cyclic imide completely dissolved. Finally the developer and the nitrogenous base were added to the solution with sufficient mixing only to ensure their dissolution, care being taken to prevent oxidation of the developer and volatilization of the nitrogenous base.

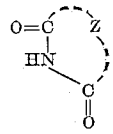
It is to be expressly understood that compositions embodying the present invention may be employed in photographic processes other than those involving transfer image formation. For example, an alkaline aqueous solution of a cyclic imide and a nitrogenous base is capable of being used as a fixer to dissolve the unreduced silver halide of a gelatino silver halide, preferably hardened, emulsion which has been photoexposed and developed.

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

What is claimed is:

1. A photographic processing composition comprising, in alkaline aqueous solution, a plurality of agents includ-

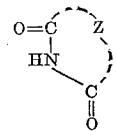
ing a first complexing agent composed of a cyclic imide characterized by the following general formula:



wherein Z represents (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, and a second complexing agent composed of a nitrogenous base selected from the class consisting of ammonia, amines, hydroxylamine, aliphatic hydroxylamines, hydrazine and aliphatic hydrazines, said first complexing agent and said second complexing agent, together, being capable of reacting with silver halide to form water-soluble, complex silver salts, at least one agent of said plurality being a silver halide developer, the concentration of said first complexing agent, by total weight of said solution, ranging from 1 to 25% and the concentration of said second complexing agent, by total weight of said solution, ranging from .15 to 15%.

2. The photographic processing composition of claim 1 wherein the alkalinity of said solution ranges from a pH of 11 to a hydroxyl ion concentration of 5 N.

3. A photographic processing composition comprising, in alkaline aqueous solution, a plurality of agents including a first complexing agent composed of a cyclic imide characterized by the following general formula:

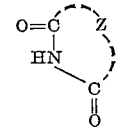


wherein Z represents (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, a second complexing agent composed of a nitrogenous base selected from the class consisting of ammonia, amines, hydroxylamine, aliphatic hydroxylamines, hydrazine and aliphatic hydrazines, said first complexing agent and said second complexing agent, together, being capable of reacting with silver halide to form water-soluble, complex silver salts, and a thickening agent so constituted as to impart to the solution a viscosity of 100 to 200,000 centipoises at 20° C., at least one agent of said plurality being a silver halide developer.

4. The photographic processing composition of claim 3 wherein the concentration of said first complexing agent, by total weight of said solution, ranges from 1 to 25% and the concentration of said second complexing agent, by total weight of said solution, ranges from .15 to 15%.

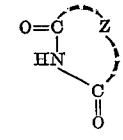
5. The photographic processing composition of claim 4 wherein the alkalinity of said solution ranges from a pH of 11 to a hydroxyl ion concentration of 5 N.

6. The photographic process comprising the steps of applying, in a thin layer to a photoexposed gelatino silver halide element, an alkaline aqueous solution of a plurality of agents including a first complexing agent composed of a cyclic imide characterized by the following general formula:



wherein Z represents (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, a second complexing agent composed of a nitrogenous base selected from the class consisting of ammonia, amines, hydroxylamine, aliphatic hydroxylamines, hydrazine and aliphatic hydrazines, and a thickening agent so constituted as to impart to the solution a viscosity ranging from 100 to 200,000 centipoises at 20° C., one agent of said plurality being a silver halide developer, reacting said complexing agents together with silver halide to form a water-soluble, complex silver salt, and reducing said complex silver salt to silver to form a reversal image.

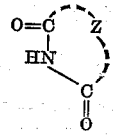
7. The photographic method of processing a photoexposed silver halide element and an image-receptive element which are in superposed relation, said method comprising the steps of subjecting said elements to a thin layer of an alkaline aqueous solution of a plurality of agents including a first complexing agent composed of a cyclic imide characterized by the following general formula:



wherein Z represents (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, a second complexing agent composed of a nitrogenous base selected from the class consisting of ammonia, amines, hydroxylamine, aliphatic hydroxylamines, hydrazine and aliphatic hydrazines, and a thickening agent so constituted as to impart to said solution a viscosity ranging from 100 to 200,000 centipoises at 20° C., one agent of said plurality being a silver halide developer, reacting said complexing agents with silver halide to form a water-soluble, complex silver salt, transferring said complex silver salt to said image-receptive element, and there reducing said complex silver salt to silver.

8. The photographic method of processing a photoexposed silver halide element and an image-receptive element which are in superposed relation, said method comprising the steps of spreading, in a thin layer between said elements, an alkaline aqueous solution of a plurality of agents including a first complexing agent composed of a

cyclic imide characterized by the following general formula:

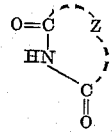


wherein Z represent (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, a second complexing agent composed of a nitrogenous base selected from the class consisting of ammonia, amines, hydroxylamine, aliphatic hydroxylamines, hydrazine and aliphatic hydrazines, and a thickening agent so constituted as to impart to said solution a viscosity ranging from 100 to 200,000 centipoises at 20° C., one agent of said plurality being a silver halide developer, reacting said complexing agents with silver halide to form a water-soluble, complex silver salt, maintaining said layer in contact with the adjacent surfaces of said elements for a predetermined period in order to transfer said complex silver salt to said image-receptive element, reducing said complex silver salt to silver on said image-receptive element, and thereafter stripping said silver halide element from said image-receptive element.

9. The photographic method of claim 8 wherein said layer adheres to said silver halide element when said silver halide element is stripped from said image-receptive element.

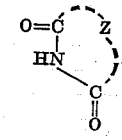
10. The photographic method of claim 8 wherein said layer adheres to said image-receptive element when said silver halide element is stripped from said image-receptive element.

11. A photographic processing composition comprising, in alkaline aqueous solution, a plurality of agents including a first complexing agent composed of a cyclic imide characterized by the following general formula:



wherein Z represents (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, a second complexing agent composed of a nitrogenous base selected from the class consisting of ammonia, amines, hydroxylamine, aliphatic hydroxylamines, hydrazine and aliphatic hydrazines, said first complexing agent and said second complexing agent, together, being capable of reacting with silver halide to form water-soluble, complex silver salts, and at least one agent of said plurality being a silver halide developer.

12. A photographic process for dissolving silver halide from an exposed, partially developed photosensitive silver halide element, said process including reacting said silver halide, in alkaline aqueous solution, simultaneously with a cyclic imide characterized by the following general formula:

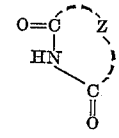


wherein Z represents (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, and a nitrogenous base selected from the class consisting of ammonia, amines, hydroxylamine, aliphatic hydroxylamines, hydrazine and aliphatic hydrazines, in order to form a water-soluble complex silver salt.

13. The photographic process of claim 12 wherein the alkalinity of said solution ranges from a pH of 11 to a hydroxyl ion concentration of 5 N.

14. The photographic process of claim 13 wherein the concentration of said first complexing agent, by total weight of said solution, ranges from 1 to 25% and the concentration of said second complexing agent, by total weight of said solution, ranges from .15 to 15%.

15. A process of forming a photographic print, said process comprising the steps of reacting substantially exposed silver halide of a photosensitive silver halide element with a silver halide developer, reacting substantially unreduced silver halide of said photosensitive silver halide element, in alkaline aqueous solution, with a first and a second complexing agent to form a water-soluble silver complex, said first complexing agent being a cyclic imide characterized by the following general formula:



wherein Z represents (1) atoms of a series completing a cyclic imide nucleus, said nucleus consisting of from 5 to 6 atoms of which from 1 to 3 are nitrogen and the remainder are carbon and (2) members branching from said atoms of said series, said members being selected from the class consisting of hydrogen atoms, amino radicals, aliphatic radicals containing from 1 to 4 carbon atoms, halogen atoms, keto oxygen atoms and aromatic radicals, at most one of said members being one of said halogen atoms, keto oxygen atoms and aromatic radicals, said second complexing agent being a nitrogenous base, transferring said complex by diffusion to an image-receptive material, and forming, at said receptive material, an image incorporating silver from said silver complex.

16. The photographic process of claim 15 wherein the alkalinity of said solution ranges from a pH of 11 to a hydroxyl ion concentration of 5 N.

17. The photographic process of claim 16 wherein the concentration of said first complexing agent, by total weight of said solution, ranges from 1 to 25% and the concentration of said second complexing agent, by total weight of said solution, ranges from .15 to 15%.

18. The photographic process of claim 15 including a thickening agent so constituted as to impart to the solution a viscosity ranging from 100 to 200,000 centipoises at 20° C.

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