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# UNITED STATES PATENT OFFICE

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## PYRIMIDINE COUPLERS

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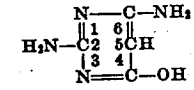
2 Claims. (Cl. 95—88)

This invention relates to color-forming development and particularly to novel coupling components for producing colored images.

It is known that colored photographic images may be formed by using a developer which forms a colored compound on development. The colored compound thus formed is deposited adjacent to the silver grains of the silver image during the development. It is also known that a colored image may be formed by adding to certain developer solutions or by incorporating in the gelatino-silver-halide emulsion before or after exposure a compound which couples during development with the oxidation product of the developing agent and forms a coloring substance which is likewise deposited adjacent to the silver grains of the silver image during development. Such a compound, which is employed in conjunction with a developing agent for the silver and which couples with the oxidation product thereof during development is referred to herein as a coupling component or coupler.

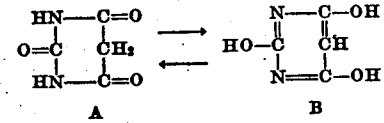
The present invention concerns new or improved color forming developers comprising a primary aromatic amino compound serving as the developing agent, and a coupler as hereinafter defined and also includes a new or improved color development process which consists in developing a reducible silver salt image in a photographic element with the aid of a primary aromatic amino compound in the presence of a coupler as hereinafter defined. It also includes photographic sensitive elements having such a coupler incorporated in one or more emulsion layers.

We have found that a compound which we believe to have a pyrimidine structure is a suitable coupler for color photography. This compound is believed to have the following structure



2,6-diamino-4-hydroxypyrimidine

It is known that many compounds having a pyrimidine structure do not couple to form a dye image in a photographic layer. For example, compounds such as uramil, 4-methyluracil, 4-amino-6-hydroxy-2-thiopyrimidine, and 2-cyanamino-4-methyl-6-hydroxypyrimidine are not couplers. Barbituric acid, which is a pyrimidine derivative, and usually represented as having a methylene group between two carbonyl groups, does not couple. Barbituric acid may be represented as having two tautomeric forms, A and B, but its failure to couple indicates that it exists, in alkaline solution, in form B:



A B

We do not know whether the compound which we have found to be a coupler exists in the form indicated above, but we intend to include within the scope of our invention, the compound in whatever form it exists.

The compound 2,6-diamino-4-hydroxypyrimidine was used as the sulfate, and was prepared according to the method described in German Patent 134,984. It forms a cyan dye.

Other aminopyrimidines, such as 6-amino-2,4-dihydroxypyrimidine and 2-cyanamino-4,6-dihydroxypyrimidine couple slowly to give cyan dyes, but are not sufficiently active to be useful.

The compound illustrated herein is suitable for incorporation in developing solutions. By the substitution of certain groups in the molecule by long-chain aliphatic groups, or other groups of suitable configuration, the coupler can be rendered non-diffusing in multi-layer coatings.

The aromatic amino developing agents used with the coupler compound of our invention include the mono-, di- and tri-aminoaryl compounds and their derivatives formed by substitution in the amino group as well as in the ring, such as alkylphenylenediamines and alkyltoluylenediamines. These compounds are usually used in the salt form, such as the hydrochloride or the sulphate, which are more stable than the amines themselves. Suitable compounds are diethyl-p-phenylenediamine hydrochloride, monoethyl-p-phenylenediaminehydrochloride, dimethyl-p-phenylenediaminehydrochloride and dimethyl-p-phenylenediamine sulphate. Developing agents containing heterocyclic systems as described in U. S. Patent 2,196,739 are also suitable. The p-aminophenols and their substitution products may also be used where the amino group is

unsubstituted. All of these compounds have an unsubstituted amino group which enables the oxidation products of the developer to couple with the color forming compounds to form a dye image.

The following developer formulas may be used with the compound of our invention:

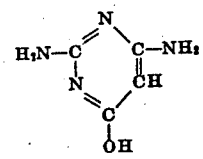
| | | |
|---|---|---|
| A. p-Aminodiethylaniline sulphate | grams | 2 |
| Sodium sulphite anhydrous | do | 5 |
| Sodium carbonate anhydrous | do | 20 |
| Potassium bromide | do | 2 |
| Water to | liter | 1 |
| B. 2,6-Diamino-4-hydroxypyrimidine | grams | 2 |
| Sodium hydroxide (10% solution) | cc | 10 |

B is added to A.

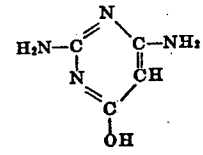
Our development process may be employed for the production of colored photographic images in layers of gelatin or other carrier such as collodion, organic esters of cellulose or synthetic resins. The carrier may be supported by a transparent medium such as glass, a cellulose ester, or a non-transparent reflecting medium such as paper of an opaque cellulose ester. The emulsion may be coated as a single layer on the support or as superposed layers on one or both sides of the support. The superposed layers may be differentially sensitized to form natural color photographic images in the well known manner.

We claim:

1. A color-forming photographic developer comprising a primary aromatic amino developing agent and a coupler compound having the following probable formula:



2. The method of producing a colored photographic image in a gelatino-silver halide emulsion layer, which comprises exposing said layer and developing it with a primary aromatic amino developing agent in the presence of a pyridine coupler compound having a probable formula



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CERTIFICATE OF CORRECTION.

Patent No. 2,355,691. August 15, 1944.

CHARLES F. H. ALLEN, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 18, claim 2, for "pyridine" read --pyrimidine--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of November, A. D. 1944.

Leslie Frazer

Acting Commissioner of Patents.

(Seal)