Patented Sept. 10, 1946

2,407,600

UNITED STATES PATENT OFFICE

2,407,600

PHOTOGRAPHIC DEVELOPER

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No Drawing. Application March 3, 1945, Serial No. 580,925

2 Claims. (Cl. 95—88)

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This invention relates to photographic developers, and more particularly to developers in which the usual alkalies are replaced by a composition new for the purpose.

One object of my invention is to provide an air-stable, moisture-resistant alkali for use in photographic developers. Another object is to provide an alkali which will give, in photographic developers, approximately the same alkalinity and results as sodium hydroxide. Another object is to provide a stable, noncaking, ready-mixed, dry developer powder. Still another object is to provide a stable, non-caking, ready-mixed, single dry developer powder. Other objects will hereinafter appear.

Alkaline developers have been known and used for many years. These developers usually contain developing agents, a so-called preservative, such as sodium sulfite, and an alkali. One of the oldest and most useful alkalies used in photographic developers is sodium hydroxide, otherwise known as caustic soda. The degree of alkalinity which it confers upon a developer has been found to be most suitable for certain purposes. However, sodium hydroxide is deliquescent and corrosive, and for this reason is difficult to handle, weigh, store and package. Moreover, when used in ready-mixed, packaged developer powders, which, because of their convenience and uniformity, are very popular among both amateur and professional photographers, sodium hydroxide is apt to cause caking, discoloration and deterioration of the powder. This renders impracticable the preparation of a single-powder developer containing sodium hydroxide.

I have discovered that a mixture of equimolecular proportions of sodium sulfite and sodium anhydroformaldehyde sulfanilate is suitable for use in photographic developers in which it is desired to have the alkaline properties of sodium hydroxide without its undesirable properties.

Sodium anhydroformaldehyde sulfanilate has the structural formula



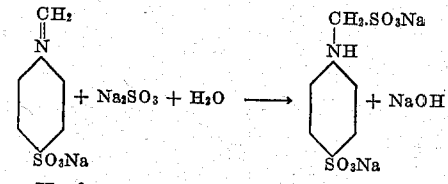
and may be prepared as follows:

Example 1.—231 g. of sodium sulfanilate were mixed with 75 g. of a 40% aqueous solution of formaldehyde. On warming to 90°–100° C., a

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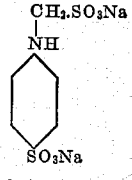
glassy liquid was formed in about 30—45 minutes. It was spread out and dried in a thin layer at 40° C. The product was ground to a white powder which was completely stable under ordinary atmospheric conditions. The yield was practically quantitative.

A mixture of anhydroformaldehyde sulfanilate and sodium sulfite is stable and non-deliquescent, and does not absorb carbon dioxide from the air. It can be weighed, stored and handled with ease. When this mixture is dissolved in water, the following reaction takes place:



The pH of a solution made by dissolving a gram-mole of sodium anhydroformaldehyde sulfanilate and a gram-mole of sodium sulfite in a given amount of water is practically the same as that of a solution made by dissolving a gram-mole of sodium hydroxide in the same amount of water. An equimolecular mixture of sodium anhydroformaldehyde sulfanilate and sodium sulfite can be used in place of sodium hydroxide, 333 parts by weight of the mixture replacing 40 parts by weight of sodium hydroxide, in all photographic developer formulae in which sodium hydroxide is specified.

The compound



formed when the mixture of sodium anhydroformaldehyde sulfanilate and sodium sulfite is dissolved in water acts as a moderately strong stabilizing agent for alkaline solutions of photographic developers. It also exerts a restraining action on photographic development. Therefore, a developer made up with this mixture shows less photographic activity than one made up with an equivalent amount of sodium hydroxide even though the pH is the same in both cases.

An equimolecular mixture of sodium anhydroformaldehyde sulfanilate and sodium sulfite can be used to prepare single-powder developers, since it does not react upon the other dry chemicals present in the powder. It will be understood that

additional sodium sulfite beyond that required to make an equimolecular mixture with the sodium anhydroformaldehyde sulfanilate may be, and usually will be, employed in the developer, to perform its usual function as a preservative.

As an example of a single-powder developer containing my novel mixture, I give the following:

Example 2

Hydroquinone----------g--	6.0	For use dissolve in 300 ml. of water at about 125 F. (50° C.); cool to temperature requisite for use.
Elon----------g--	1.5	
Sodium sulfite----------g--	24.0	
Sodium anhydroformaldehyde sulfanilate----------g--	26.0	
Potassium bromide----------g--	1.0	

This developer has all ingredients mixed intimately together in a single container and remains stable in dry form, without discoloration.

What I claim as my invention and desire to be secured by Letters Patent of the United States is:

1. A photographic developer, in dry form, containing a developing agent and, as an alkali, a mixture, in equimolecular amounts, of sodium anhydroformaldehyde sulfanilate and sodium sulfite.

2. A photographic developer in the form of a single dry powder, containing a developing agent and, as an alkali, a mixture, in equimolecular amounts, of sodium anhydroformaldehyde sulfanilate and sodium sulfite.

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