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CHEMICAL COMPOSITION FOR ACID HARDENING PHOTOGRAPHIC FIXING BATHS

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2 Claims. (Cl. 95—88)

This invention relates to photographic baths, with more particular reference to acid hardening fixing baths, and has for its principal object to provide a mixture of chemicals that can be packaged and merchandised in a dry state, and which has pronounced advantages over dry mixtures heretofore used for this purpose.

More particularly, the object of the invention is to afford a mixture of dry chemicals which is stable under atmospheric changes and not subject to interaction upon each other while in a dry state due to moisture, preventing caking and consequent loss of efficiency by the breakdown of some of the ingredients, the mixture forming the subject matter of the invention being either entirely free from water of crystallization or so composed that it is less seriously affected by any water of crystallization present, thus increasing the useful life and efficiency of the composition.

In one aspect, the invention is designed to eliminate entirely water of crystallization in the mixture by using only anhydrous compounds, and in addition to preventing detrimental caking of the dry powdered mass, the invention has for a further objective to afford a mixture which when dissolved in water may possess greater gelatin-hardening qualities than materials heretofore used and will resist sludging or precipitation of aluminum compounds or other non-solubles upon addition of alkali resulting from developer solutions, and with a minimum change in its pH value or the acid ion concentration of the solution.

Acid hardening photographic fixing baths have been produced by combining a silver halide solvent such as sodium thio-sulfate, a preserving agent such as sodium sulfite, a suitable acidifying agent such as acetic acid or sodium acid sulfite, and a hardening agent such as aluminum potassium sulfate, and I have found that by the addition of dextro-gluconic acid, mucic acid, or other derivative of a hexose, precipitation of the insoluble compounds upon addition of alkaline developing solution is more effectively prevented throughout the full life of the bath or until the sodium thiosulfate is exhausted, the hydrogen ion concentration or pH value of the bath is properly maintained for photographic purposes, and the solution has an increased hardening effect on the gelatin.

In general, the invention resides in providing a dry mixture of chemicals to be used in an acid hardening photographic fixing bath, the mixture including as one element a derivative of a hexose, such as gluconic acid, mucic acid, or salts thereof, capable of producing gluconic or mucic ions in solution.

The invention involves the use of gluconic acid, mucic acid, or salts thereof, or other derivative of a hexose, as a constituent part of a dry chemical mixture that is dissolved in water to produce a photographic acid fixing bath having proper gelatin-hardening and non-sludging characteristics. Such a dry mixture which in other respects is composed of the chemicals conventionally used in such photographic fixing baths may be variously formed, and the following are given as merely illustrative of several formulas that may be successfully used, and which incorporate the invention:

Formula No. 1

	Grams
Sodium thiosulfate (anhydrous)	120
Sodium bisulfite (anhydrous)	30
Aluminum gluconate	30

This affords a dry mixture suitable for dissolving in a quantity of water to make one liter of acid fixing solution.

Formula No. 2

	Grams
Sodium thiosulfate (anhydrous)	120
Sodium bisulfite (anhydrous)	30
Sodium gluconate	4.5
Potassium aluminum sulfate	15

Formula No. 3

	Grams
Sodium thiosulfate (anhydrous)	120
Sodium bisulfite (anhydrous)	30
Mucic acid	3
Potassium aluminum sulfate	15

The amount of sodium gluconate should approximate one-third the weight of the potassium aluminum sulfate, and the amount of mucic acid should approximate one-fifth of the amount of potassium aluminum sulfate, although greater proportion of the gluconic or mucic compound may be used without any particular disadvantage in the qualities or effectiveness of the bath.

I have found that satisfactory gelatin-hardening and non-sludging results are obtainable by using in place of a gluconic acid derivative, a salt, lactone, or other derivative of various acids derived from carbohydrates of the sugar type, such as a hexose or pentose, including for instance dextro-saccharic acid, levuo-idonic acid, and dextro-arabonic acid.

The above proportions are not critical and may be varied, and the disclosure of this application

may be otherwise modified in practice without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A dry mixture of chemicals which when dissolved in water produces an acid hardening photographic fixing bath, including a silver halide solvent, a sulfite, and a dextro-gluconic material which produces gluconic ions in a fixing bath.

2. A dry mixture of chemicals which when dissolved in water produces an acid hardening photographic fixing bath, including a silver halide solvent, a sulfite, and aluminum gluconate.

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