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3,684,512

PHOTOGRAPHIC MONOBATHS

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6 Claims

ABSTRACT OF THE DISCLOSURE

Photographic papers normally exhibit objectionable post-processing curl, that is curl after processing and drying. A monobath which reduces curl contains a silver halide solvent, silver halide developing agent, alkali, a polyethylene oxide, sorbitol and diethanolamine.

This invention relates to photography and more particularly to monobaths which reduce post-processing curl on photographic papers.

Photographic papers include a paper support and at least one gelatin-silver halide emulsion layer coated thereon. Such papers after development, fixation and drying commonly exhibit curl. Humectants are often added to or coated on the paper stock to reduce curl. When the paper is exposed and developed by use of a so-called monobath containing silver halide developing agent and silver halide solvent, which dispenses with separate developing and fixing steps, the salt content of the monobath is relatively high and many humectants cannot be used on the paper or in the monobath. The prints obtained by use of the monobaths are normally not washed.

We have discovered monobaths which greatly reduce post-processing curl on photographic paper. The monobaths contain, in addition to the usual silver halide developing agent, silver halide solvent and alkali, a polyethylene oxide, sorbitol and diethanolamine.

The polyethylene oxide is one soluble in water and preferably has a molecular weight of about 200-600. The sorbitol and diethanolamine are present in amounts sufficient to keep the polyethylene oxide in solution and to provide alkalinity. About 10-100 gms. sorbitol and about 5-100 gms. diethanolamine can be used for this purpose depending somewhat on the solubility of the particular polyethylene oxide in the monobath under consideration. Neither compound is adequate per se for use in keeping the oxide in solution, the amine can be used only in relatively low concentrations or unexpectedly the prints have objectionable stain. Accordingly the sorbitol is used as an additional solvent for the oxide. A number of other amines such as triethanolamine cannot be used in the monobath. The monobath preferably also contains an agent to reduce or prevent precipitation of silver onto the paper during processing. Mercaptans such as disclosed in British Pat. 1,063,844, e.g. 1-phenyl-5-mercaptotetrazole, are useful for this purpose.

The photographic paper which is used with the monobath is well-known in the art and includes a gelatin-silver halide emulsion layer coated on a paper base such as a 20-30 lb. per 1000 sq. ft. paper base. The emulsions on the paper are for example silver chloride, silver chlorobromide, etc. emulsions.

The following examples will serve to illustrate our invention.

EXAMPLE 1

A photographic paper having a weight of about 20 lbs./1000 ft. sq. carrying a gelatin-silver chloride emulsion layer is exposed and treated at 20° C. for 10 secs. in the following solution and dried.

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FORMULA A

Water	ml.	700
Diaminopropanol tetraacetic acid	grams	1.0
Sodium sulfite	do.	110.0
5 Sodium hydroxide ¹	do.	4.5
Hydroquinone	do.	18.0
1-phenyl-5-mercaptotetrazole	do.	0.4
Sodium thiosulfate .5H ₂ O	do.	120.0
10 Sorbitol	do.	50.0
Diethanolamine	ml.	50.0
Polyethylene oxide m. wt. 400	ml.	50.0
Water to make 1 liter.		
pH		10.45±0.05
15 Polyethylene oxide	ml.	50.0

¹ Variable to obtain pH.

The images on the paper are satisfactory and curl is much better than when using essentially the same formula free of sorbitol, polyethylene oxide and diethanolamine. The curl test is run on 10 cm. discs cut from the paper and conditioned at 18% RH then 70% RH and again at 18% RH.

To determine the amount of curl in paper ten disc samples, 10 centimeters in diameter, are cut from the paper being tested. These samples are conditioned at the proper relative humidity and then the distance, in centimeters, between the edges is measured. The number is subtracted from 10 and this is the curl value for this sample. The values of the ten samples are averaged to give a curl value for that variation. Large curl values mean high curl and small curl values mean low curl or flatness.

The following curl values are obtained for the above Formula A of the invention compared to substantially the same Formula B free of the last three chemicals of Formula A.

	Relative humidity, percent		
	18	70	18
Formula A curl..	1.6	1.2	3.6
45 Formula B curl..	4.7	0.6	7.9

The first 18% value represents the level of curl obtained when the product is first dried to low moisture level and the second 18% RH value represents the more severe condition associated with a cycling of humidity conditions. The monobath Formula A of the invention yields a considerable curl reduction.

EXAMPLE 2

The following solution is used as in Example 1 for processing the photographic paper.

Water	ml.	700
Diaminopropanol tetraacetic acid	grams	1.0
Sodium sulfite	do.	110.0
60 Sodium hydroxide ¹	do.	5.0
Hydroquinone	do.	18.0
Sodium thiosulfate .5H ₂ O	do.	120.0
1-phenyl-5-mercaptotetrazole	do.	0.4
Sorbitol	do.	25.0
65 Diethanolamine	ml.	25.0
Polyethylene oxide m. wt. 400	ml.	37.5
Water to make 1 liter.		
pH		10.75±0.05

¹ Variable to obtain pH.

Improvement in curl is obtained similar to that obtained in Example 1.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

What we claim is:

1. A photographic monobath processing solution for simultaneously developing and fixing a photograph paper carrying an exposed gelatin-silver halide emulsion layer, comprising alkali, silver halide solvent, a silver halide developing agent, a water-soluble polyethylene oxide in amount sufficient to reduce curl on the processed photographic paper and sorbitol and diethanolamine in amounts sufficient to keep the polyethylene oxide in solution.

2. The solution according to claim 1 further containing an agent for reducing precipitation of silver on said photographic paper.

3. The solution according to claim 2 wherein said agent is a mercaptan.

4. The solution according to claim 3 wherein the mercaptan is 1-phenyl-5-mercaptotetrazole.

5. The solution according to claim 1 containing about 10-100 gms. sorbitol and about 5 to 100 gms. diethanolamine per liter.

6. The solution according to claim 1 wherein the polyethylene oxide has a molecular weight of about 200-600.

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