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[54] PHOTOGRAPHIC LIGHT-SENSITIVE MATERIAL HAVING A BACK LAYER 4 Claims, No Drawings

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 A, 87

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ABSTRACT: In a photographic material having a backing layer for antihalation, the sticking of the back layer to other emulsion layers can be prevented when the material is rolled and stored at a high temperature and high humidity, by incorporating in the backing layer a surface active agent such as 2-ethylhexyl sodium sulfate, sodium N-stearoyltaurine, sodium stearate, sorbitan monostearate, sorbitan tristearate, polyoxyethylene sorbitan tristearate, polyoxyethylene sorbitan monolaurate and behenic acid amide. The surface active agent has the property of forming aggregates which prevent sticking of the backing layer to other layers with which it comes in contact.

PHOTOGRAPHIC LIGHT-SENSITIVE MATERIAL HAVING A BACK LAYER

BACKGROUND OF THE INVENTION:

1. Field of the Invention

This invention relates to a photographic light-sensitive material having an improved backing layer for antihalation and more particularly, it is concerned with an improved photographic material of which the undesirable sticking property caused by high-temperature and high humidity conditions is reduced by incorporating a surface active agent in the backing layer.

For the purpose of preventing the halation or scattering of light caused by reflection of light from a support to a light-sensitive emulsion layer, it has generally been carried out to provide a so-called backing layer on the back side of a light-sensitive emulsion layer of a black-and-white or color photographic film by application of a solution or dispersion of an antihalation dye or pigment such as carbon black in an alkali-soluble resin solution.

However, such backing layer, due to its hydrophilic property, tends to present serious obstacles, such as being transferred and adhered to another emulsion layer when stored at a high temperature and high humidity in the form of a roll as in cinema film.

2. Description of the Prior Art

Up to this time, a method of incorporating an oil-miscible surface active agent in a backing layer has been proposed to prevent the adhesion of the backing layer to other layers, but if too much is incorporated, the backing layer becomes hydrophobic and repellent to other surfaces. Thereby, the adhesiveness to a support is lowered and it is hardly removed rapidly by developing. Another attempt to prevent adhesion to a light-sensitive emulsion layer, by adding a matting agent, such as colloidal silica, to the raw material for the backing layer to coarsen the surface thereof, has generally been unsatisfactory, primarily because a grain size of several microns is not effective for preventing the adhesion and, if the matting agent has a grain size sufficient therefor, it tends to settle prior to application.

The principal object of the invention is to provide a photographic light-sensitive material having a backing layer whose adhesiveness is improved, wherein the aforementioned disadvantages are overcome.

SUMMARY OF THE INVENTION

We have found that the object can be accomplished by adding to a backing layer coating solution, consisting of an alkali-soluble resin, antihalation dye or pigment (hereinafter they are called only "dye"), such as carbon black and organic solvent, a surface active agent that is soluble in the organic solvent at normal temperature, does not deteriorate the stability of the dispersion of antihalation dye, and the solubility of which in the organic solvent lowers at a certain low temperature to cause aggregation. That is to say, when the coating solution containing the surface active agent having above-mentioned property is coated onto the back side of a photographic film, the surface active agent becomes aggregated with, for example, carbon black in a size of 0.1-5 microns (the surface active agent is granulated and carbon black is aggregated to a large size), as the surface is cooled by heat of vaporization during the coating, and thus a coarsened backing layer is obtained. Adhesion to a photographic emulsion surface hardly occurs even when the photographic film having such a backing layer was stored, for example, in the form of a roll.

Examples of surface active agents used in the invention, the solubility of which in conventional organic solvents is large at normal temperature but becomes small at a somewhat lower temperature, are 2-ethylhexylsodium sulfate, sodium N-stearoyltaurine, sodium stearate, sorbitan mono-stearate, sorbitan tristearate, polyoxyethylene sorbitan tristearate, polyoxyethylene sorbitan monolaurate and behenic acid amide.

As the other components to be incorporated in the backing layer of our invention there may be used conventional materials. For example, styrene-maleic anhydride copolymer, vinyl acetate-maleic anhydride copolymer or butyl vinyl ether-maleic anhydride copolymer is used as an alkali-soluble resin, carbon black, 3, 9-dihydroxy-6p-methoxystyrylxanthorium chloride, tetramethyl-1,4-diaminotriphenyl methane or Malachite Green (C.I. No. 657), as an antihalation dye, and methanol, ethanol, acetone, isopropanol or methyl ethyl ketone as an organic solvent.

In the photographic material having the backing layer of the invention, not only is the adhesiveness to other materials improved, but the subsequent processings can be carried out without any trouble. Although the surface active agent suitable for use as an antiadhesive agent in the invention is substantially hydrophobic, it is scattered as microscopic dots by aggregation, and there is no obstacle to permeation of a processing solution in the step of film elimination during developing, so that film elimination proceeds rapidly. Moreover, a uniformly coarsened surface can be obtained because a satisfactory liquid stability is maintained, in spite of the system being generally unstable when a matting agent is dispersed in the coating solution.

EXAMPLE 1

Styrene-maleic anhydride copolymer	2.0 g.
Methanol	50.0 g.
Acetone	50.0 g.
Carbon black	1.0 g.
Behenic acid amide	0.2 g.

A photographic film having a coating of the foregoing composition as a backing layer and a coating of light-sensitive emulsion on a film base of cellulose triacetate exhibited a good adhesion resistance after being stored in a tightly wound roll.

EXAMPLE 2

Vinyl acetate-maleic anhydride copolymer	3.0 g.
Methanol	75.0 g.
I-propanol	25.0 g.
Carbon black	1.5 g.
Sodium stearate	0.18 g.

A solution of polyvinyl alcohol was applied to a support of cellulose triacetate, dried and a coating solution of the foregoing composition was then overcoated in the conventional way. A photographic emulsion layer was applied to the other side of the support. When the resultant photographic film was wound in a roll and subjected to severe conditions, such as a temperature of 40° C., and a relative humidity of 80 percent for 3 days, there was found no adhesion between the backing layer and the photographic emulsion layer.

EXAMPLE 3

Butyl vinyl ether-maleic anhydride copolymer	2.0 g.
Ethanol	80.0 g.
Methyl ethyl ketone	20.0 g.
Carbon black	1.3 g.
Polyoxyethylene sorbitan ester	0.25 g.

A coating solution of the foregoing composition was applied to the back side of a polyester film base having a light-sensitive emulsion layer in the conventional manner and dried.

Even after the photographic film was wound tightly in a roll and stored, for 6 months, there was found no adhesion of the backing to the emulsion layer.

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What is claimed is:

1. In a photographic material having a photographic light-sensitive emulsion layer and an antihalation backing layer on the [back] opposite side of a film support on which the emulsion layer is coated, said backing layer being providing by applying a coating solution containing an alkali-soluble resin, an antihalation dye and organic solvent, the improvement comprising a surface active agent selected from the group consisting of 2-ethylhexyl sodium sulfate, sodium-N-stearoyl-taurine, sodium stearate, sorbitan mono-stearate, sorbitan tristearate, polyoxyethylene sorbitan tristearate, and polyoxyethylene sorbitan monolaurate incorporated in said coating solution, said surface active agent being soluble in said organic solvent at ambient temperatures, but forming a finely dispersed aggregate in said solution as said solution is cooled, said aggregate serving to prevent sticking of the dried backing layer

to other surfaces with which it comes in contact.

2. A photographic material as claimed in claim 1, wherein said alkali-soluble resin is a member selected from the groups consisting of styrene-maleic anhydride copolymer, vinyl acetate-maleic anhydride copolymer, butyl vinyl ether-maleic anhydride copolymer.

3. A photographic material as claimed in claim 1, wherein said antihalation dye is a member selected from the groups consisting of carbon black, 3,9-dihydroxy-6-p-methoxystyryl-anthorium chloride, tetramethyl-1,4-diaminotriphenyl methane and Malachite Green.

4. A photographic material as claimed in claim 1, wherein said organic solvent is a member selected from the groups consisting of methanol, ethanol, acetone, isopropanol and methyl ethyl ketone.

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