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GELATINO-SILVER HALIDE PHOTOGRAPHIC ELEMENTS CONTAINING HIGHER FATTY ALCOHOLS

Filed March 24, 1945

FIG. 1.

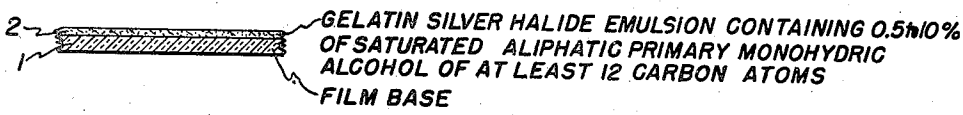
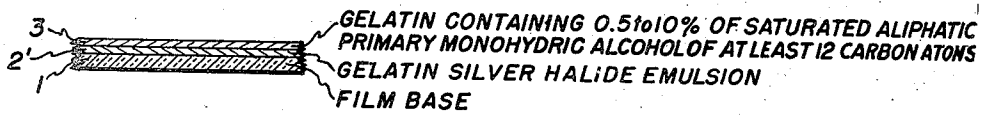


FIG. 2.



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GELATINO-SILVER HALIDE PHOTOGRAPHIC ELEMENTS CONTAINING HIGHER FATTY ALCOHOLS

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7 Claims. (Cl. 95—7)

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This invention relates to photographic materials and particularly to the production of photographic emulsions and photographic elements consisting of a support carrying a layer of photographic emulsion.

Photographic emulsions usually consist of a dispersion of one or more silver halides, e. g. silver bromide or silver chloride, in gelatin, though other colloidal binding agents have been proposed. It is found that such emulsions, coated to form photographic elements, have a tendency to become scratched in use, and various methods of overcoming this difficulty have been proposed. Thus, in the case of film to be used for cinematographic purposes it has been proposed to apply a coating of wax over the surface of the emulsion, this serving apparently as a lubricant and for that reason reducing the formation of scratch marks.

It has now been discovered that the tendency for photographic emulsion layers and other outer colloid layers of photographic elements to become scratched in use may be reduced by including in the emulsion layer or other outer colloid layer during its manufacture, or by applying to the surface of the coated emulsion layer or other outer colloid layer, a small proportion of a higher fatty alcohol which is solid at ordinary (room) temperatures.

The invention is of particular value in connection with the production of photographic materials carrying gelatino silver halide emulsions.

In the series of fatty alcohols, those containing 12 or more carbon atoms are solid at ordinary temperatures, and the present invention, therefore, envisages the use of dodecyl alcohol and the higher homologous members of the series, e. g. cetyl alcohol, ceryl alcohol, miricyl alcohol and stearyl alcohol. It is particularly to be observed that the compounds used are the free alcohols and not the corresponding esters.

One convenient method of adding the higher fatty alcohols to a photographic emulsion is to dissolve the higher fatty alcohol in a solvent, e. g. a lower fatty alcohol such as ethyl alcohol, and stir the resulting solution into the liquid photographic emulsion or into the colloid (or part thereof) which is to be used in making the photographic emulsion. Alternatively, the higher fatty alcohol may be added in molten form, i. e. at a temperature above its melting point. In general it is found desirable to include a small proportion of a dispersing agent in the photographic emulsion, or in the solution of the higher fatty alcohol, in order to facilitate dispersion of

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the alcohol in the emulsion. Any of the well known surface-active wetting agents may be employed for this purpose, e. g. soluble salts of long-chain-alkyl carboxylic acids, of long-chain-alkyl sulphonic acids, of sulphated higher fatty alcohols, of sulphated long-chain secondary alcohols, or of alkylated aromatic sulphonic acids. Such soluble salts may be salts formed from alkali metals or ammonia or amines, e. g. triethanolamine and cyclohexylamine. The various commercial products sold as dispersing agents for use in the dyeing and textile industries may be so employed.

The preferred method of incorporating the higher fatty alcohol in a photographic emulsion is to form an aqueous dispersion of the alcohol by the assistance of a dispersing agent and to add this aqueous dispersion to the liquid photographic emulsion or to a portion of the colloid, usually gelatin, to be used in forming the photographic emulsion.

As indicated above, the higher fatty alcohol may be applied as a surface coating to the emulsion instead of being directly incorporated therein. Thus the higher fatty alcohol in the form of an aqueous dispersion, in the form of a solution in a suitable solvent such as a lower alcohol, or in molten form, may be applied directly to the surface of the coated emulsion. Alternatively, the higher fatty alcohol may be dispersed in a colloid medium, e. g. gelatin, and the resulting colloid dispersion coated as a layer over the photographic emulsion.

Only a small proportion of higher fatty alcohol is necessary to obtain the desired effect. The optimum proportion appears to depend on the particular higher fatty alcohol employed and, where the higher fatty alcohol is dispersed in the emulsion or a superposed colloid layer, on the nature of such emulsion or colloid layer. In general it is found that for gelatin emulsions and colloid layers, proportions varying from about 0.5% to 10%, or even more, on the weight of the gelatin or other colloid, are practical though, generally speaking, a proportion of 2 to 3% gives the optimum result. Where the higher fatty alcohol is applied as a coating to the emulsion, it should be applied as a thin layer, e. g. 1.0 to 5.0μ thick. Such a layer, coated on the surface of an unprocessed emulsion, does not seriously affect the processing of the emulsion with the normal processing liquids.

Two photographic elements of the type described above are illustrated in the accompanying drawing wherein

Fig. 1 constitutes a sectional view of one type of element, and

Fig. 2 is a sectional view of another type of element.

Referring now to Fig. 1, a film base 1 has coated on one side thereof a gelatino-silver halide emulsion layer 2 which has uniformly dispersed therethrough a higher unsubstituted, saturated, aliphatic, primary monohydric alcohol of at least 12 carbon atoms and which is solid at ordinary temperatures.

The film element of Fig. 2 consists of a film base 1 which has dispersed on one side thereof a gelatino-silver halide emulsion layer 2' on which there is coated a layer 3 which is composed of gelatin which has uniformly dispersed therethrough an alcohol of the aforementioned type.

Whilst this invention is primarily concerned with the treatment of the photographic emulsion during its manufacture or at some stage prior to processing, a layer containing a higher fatty alcohol may be coated, in accordance with this invention, on the surface of fully processed materials, e. g. on either or both surfaces of processed cine film where the higher fatty alcohol assists in the prevention of the scratch marks which commonly arise during the running of the film through projector mechanism.

The following example illustrates the invention:

Example

Gelatin	gms	20
Teepol X	cc	40
Water	do	80
Stearyl alcohol	do	2

Teepol X is a commercial anion-active composition containing about 25% active agent. The dispersion was prepared by melting the above ingredients together and vigorously stirring while allowing the composition to cool to about room temperature. After the addition of the dispersion to the emulsion, the emulsion was coated on glass plates and dried by the usual technique.

It was found that the coated plates were much less easily scratched than corresponding plates prepared without the addition of the stearyl alcohol.

What we claim is:

1. A photographic element comprising a support bearing a light-sensitive gelatino-silver halide emulsion layer and having in an outer layer of said element a single film-forming polymer consisting of gelatin which has uniformly dispersed therethrough from 0.5 to 10.0% by weight of an unsubstituted, saturated, aliphatic, primary monohydric alcohol of at least 12 carbon atoms and which is solid at ordinary temperatures based on the gelatin.

2. A photographic element comprising a support bearing a light-sensitive gelatino-silver halide emulsion layer and having in an outer layer of said element a single film-forming polymer consisting of gelatin which has uniformly dispersed therethrough a small proportion of a surface-active wetting agent and from 0.5 to 10.0% by weight of an unsubstituted, saturated, aliphatic, primary monohydric alcohol of at least 12 carbon atoms and which is solid at ordinary temperatures based on the gelatin.

3. A photographic element comprising a support bearing a light-sensitive gelatino-silver halide emulsion layer and having in an outer layer of said element a single film-forming polymer consisting of gelatin which has uniformly dispersed therethrough from 0.5 to 10.0% by weight of stearyl alcohol based on the gelatin.

4. A photographic element comprising a support bearing a light-sensitive gelatino-silver halide emulsion layer which has uniformly dispersed therethrough from 0.5 to 10.0% by weight of an unsubstituted, saturated, aliphatic, primary monohydric alcohol of at least 12 carbon atoms and which is solid at ordinary temperatures based on the gelatin, said gelatin being the only film-forming polymer in the emulsion layer.

5. A photographic element comprising a support bearing a light-sensitive gelatino-silver halide emulsion layer which has uniformly dispersed therethrough a small proportion of a surface-active wetting agent and from 0.5 to 10.0% by weight of an unsubstituted, saturated, aliphatic, primary monohydric alcohol of at least 12 carbon atoms and which is solid at ordinary temperatures based on the gelatin, said gelatin being the only film-forming polymer in the emulsion layer.

6. A photographic element comprising a support bearing a light-sensitive gelatino-silver halide emulsion layer which has uniformly dispersed therethrough from 0.5 to 10.0% by weight of stearyl alcohol based on the gelatin, said gelatin being the only film-forming polymer in the emulsion layer.

7. A photographic element comprising a support bearing a light-sensitive gelatino-silver halide emulsion layer having coated thereon an outer layer consisting of gelatin as the sole film-forming polymer which has uniformly dispersed therethrough from 0.5 to 10.0% by weight of an unsubstituted, saturated, aliphatic, primary monohydric alcohol of at least 12 carbon atoms and which is solid at ordinary temperatures based on the gelatin.

WILFRID HAMPDEN DIMSDALE.
KENNETH JOHN CHALLIS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,411,677	Trivelli	Apr. 4, 1922
2,118,059	Slack et al.	May 24, 1938
2,271,622	Carroll et al.	Feb. 3, 1942
2,271,623	Carroll	Feb. 3, 1942
2,272,191	Fierke	Feb. 10, 1942
2,275,727	Carroll et al.	Mar. 10, 1942
2,304,939	Mannes et al.	Dec. 15, 1942
2,304,940	Mannes et al.	Dec. 15, 1942

FOREIGN PATENTS

Number	Country	Date
514,251	Great Britain	Nov. 3, 1939

Certificate of Correction

Patent No. 2,454,043. November 16, 1948.

WILFRID HAMPDEN DIMSDALE ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 3, line 31, under the heading "Example", insert the following paragraph:

"To 2000 cc. of a gelatin silver iodobromide emulsion was added a dispersion of the following composition:

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 7th day of June, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.