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3,506,449

**GELATIN COATING COMPOSITIONS WITH N-TALLOW- $\beta$ -IMINODIPROPIONIC ACID**

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9 Claims

**ABSTRACT OF THE DISCLOSURE**

This invention relates to proteinaceous coating compositions and photographic elements containing the same wherein said coating composition comprises the salt of N-tallow- $\beta$ -iminodipropionic acid.

This invention relates to proteinaceous compositions such as of gelatin or casein, containing a coating aid of an alkyl derivative of iminodiacetic or iminodipropionic acid therein.

In the photographic industry it is often desirable that the protein coatings, either the photographic emulsion or other coatings, have both good surface slickness and good developer wettability.

In the coating of film or paper with a gelatin layer such as of a photographic emulsion or some other gelatin coating composition, uniform application of the composition to the surface to which it is supplied is desirable especially at good production speeds. When no coating aid is used, defects such as repellencies, pencil line streaks or the like arise. Saponin has been employed, in this connection, as a coating aid but this material has been found to vary markedly from batch to batch in quality and composition. Not only may this adversely affect a photographic emulsion containing it but in some instances only little or no improvement in coating properties may be obtained.

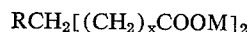
A number of synthetic materials have been suggested as coating aids in gelatin compositions and many of these materials have shown themselves to be useful in applying a gelatin coating to a surface. Sometimes, however, these coating aids have left something to be desired particularly in coating methods in which several coatings are applied to a support simultaneously such as in the manner described in U.S. Patent No. 2,761,791 of T. A. Russell.

One object of this invention is to provide proteinaceous coating compositions which yield blemish-free coatings having good surface slickness and developer wettability when those compositions are laid down as a layer upon a support. Another object of this invention is to provide gelatin and casein coating compositions which are useful when applied over paper or film base support or over a previous gelatin coating residing upon a support. A further object of this invention is to provide proteinaceous coating compositions containing alkali metal salts or alkyl derivatives of iminodiacetic acid and or iminodipropionic acid in which the alkyl radical is 12–18 carbon atoms. Other objects of this invention will appear herein.

It has now been found that salts of alkyl derivatives of iminodiacetic or iminodipropionic acid, the alkyl radical being of 12–18 carbon atoms, are useful as coating aids in proteinaceous coating compositions giving layers having good surface slickness, good developer wettability, which compositions are useful for application either over a support or over a previous proteinaceous coating. We have found that coatings may be applied from three compositions which are substantially free of defects such as pencil line streaks, mottle and general streakiness such as frequently characterizes coatings especially in multiple layer hopper coating operations.

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The coating aids which I have found to be useful in proteinaceous compositions are those having the formula:



in which  $x=1-2$ ,  $R$ =a 11–17 carbon hydrocarbon radical and  $M$  is a cation which will contribute to the water solubility of the coating aid and may be ammonium, sodium or some other alkali metal. Of particular usefulness are those coating aids such as the alkali metal or ammonium salts of N-tallow- $\beta$ -iminodipropionic acid in which tallow has been used to supply the alkyl radical of the acid which comprises mainly  $C_{16}$  and  $C_{18}$  groups—hexadecyl and octadecyl groups. See Feiser and Feiser, Introduction to Organic Chemistry, 1957, D. C. Heath and Company, page 295.

Coating aids of this type may generally be prepared as known in the prior art and as disclosed in Bulletin 15-A, "Deriphats," General Mills Chemical Division, 1961, and in U.S. Patents 2,468,012 and 2,816,920. Tallow which can be used in the preparation, for example, may have as the relative proportions of the acid portion thereof 61% stearoyl (stearic acid), 6% palmitoyl (palmitic acid) and 33% oleyl (oleic acid). It has been found that in general the coating aid should be used in a concentration between about 0.2 and 2.7 parts per 100 parts of the protein, e.g., gelatin or casein, in the composition.

Although the protein compositions in accordance with this invention are useful for applying single layers they are especially useful in the laying down of a plurality of layers in a simultaneous coating operation in a multiple coating technique such as on the order of that described in U.S. Patent No. 2,761,791 of T. A. Russell. Coating operations of this type give coatings substantially free of defects. Instead of a multiple layer operation in which the layers are simultaneously applied, the plurality of layers may be applied in sequence such as by coating one layer over a previous gelatin or casein layer either by a wet-on-wet coating operation or by a wet-on-dry procedure.

The following examples illustrate coating procedures employing compositions in accordance with our invention:

**EXAMPLE 1**

There was applied simultaneously to paper by a multiple coating technique as described in U.S. Patent No. 2,761,791 a gelatin-silver halide photographic emulsion and an aqueous gelatin overcoating layer using as the coating aid in each composition the sodium salt of N-"tallow" iminodipropionic acid in concentrations from 0.07 to 0.5 gram per pound of composition. The resulting layers in each case exhibit good developer spreading and slickness values as compared to compositions in which no coating aid was used. Also the products exhibited freedom from streakiness and other similar coating defects. The developer wettability is determined by recording the area covered upon delivering one ml. of developer solution to a flat section of a dried coating and measuring the area in square centimeters which is wet thereby.

**EXAMPLE 2**

A wet-on-dry application was made of a dyed gelatin coating to film base as an antihalation layer. The coating aid used was the sodium salt of N-"tallow" iminodipropionic acid in the proportion of 0.22 gram per pound of gelatin overcoating composition. The resulting coating had a smooth surface and was substantially free of mottle or streakiness.

**EXAMPLE 3**

Coatings of gelatin-silver halide photographic emulsion having therein as the coating aid a mixture of the di-

sodium salts of N-"tallow" iminodipropionic acid and N-lauroyl carboxymethyl glycine were coated out onto paper. The ratios of the two coating aid materials were 3:1 and 1:3 respectively, the coating aid being present in each case in a concentration of 0.25 gram per pound of wet emulsion. In each case products were obtained having good surface slickness, good smoothness, good wettability with developer solution and freedom from surface defects.

In each of the examples given each pound of composition contains 37 grams of gelatin or casein. The coating aid is present in an amount within the range of about 1.9 to about 2.7 parts thereof per 100 parts of the gelatin or protein in the coating composition in which it is used.

I claim.

1. A coating solution for coating at least one layer of a photographic element comprising a proteinaceous composition and containing a wetting agent which comprises an alkali metal or ammonium salt of N-tallow- $\beta$ -iminodipropionic acid.

2. A coating composition according to claim 1 wherein said coating composition comprises a silver halide.

3. A coating composition according to claim 1 wherein said coating composition comprises a silver halide and said proteinaceous composition comprises gelatin.

4. A coating solution for coating at least one layer of a photographic element comprising a proteinaceous composition and containing a wetting agent which comprises disodium salt of N-tallow- $\beta$ -iminodipropionic acid.

5. A coating solution according to claim 4 wherein said disodium salt of N-tallow- $\beta$ -iminodipropionic acid is

present in an amount ranging from approximately 0.2 to 2.7 parts per 100 parts of said proteinaceous composition.

6. A coating solution according to claim 4 which comprises a silver halide composition.

7. A coating solution according to claim 4 wherein said proteinaceous composition comprises gelatin.

8. A photographic element comprising a support, at least one light-sensitive silver halide layer and at least one layer comprising a proteinaceous composition and containing a wetting agent comprising an alkali metal or ammonium salt of N-tallow- $\beta$ -iminodipropionic acid.

9. A photographic element according to claim 8 wherein said proteinaceous composition is a gelatin.

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