

prises dissolving a color former fast to diffusion, in water containing a water-soluble alkali, in the presence of a compound selected from the class consisting of bile acids and salts thereof, mixing the solution with a silver halide emulsion and casting the resulting mixture.

11. The process as defined in claim 10, wherein the water-soluble alkali is caustic soda.

12. The process as defined in claim 9, wherein the color former is fast to diffusion by virtue of the presence therein of an aliphatic chain of more than 5 carbon atoms.

13. The composition as defined in claim 4, wherein said compound is a salt of cholic acid.

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PHOTOGRAPHIC EMULSION

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Our present invention relates to a photographic emulsion and more particularly to a silver halide emulsion for color photography.

In the production of color photographic images the image dyestuff is often directly or indirectly formed by means of a silver image from dyestuff components one or several of which have already been incorporated into the silver halide emulsion before exposure. In multi-layer materials it is necessary in order to obtain an unobjectionable color separation that the dyestuff components be fast to diffusion with respect to the layer-forming colloid, for instance, gelatin, i. e. that they do not diffuse from layer to layer or from the layers into the photographic baths during the production of the layers and the treatment thereof in the baths even if they are added to the emulsion in a soluble form. This fastness of diffusion of the dyestuff formers may, for instance, be effected by their special chemical constitution or by the introduction into the molecule of certain radicles. Dyestuff formers made fast to diffusion by substituting the same with such groups which essentially increase the molecular weight thereof often are sparingly water-soluble. Such sparingly soluble dyestuff formers have the advantage that it is difficult to keep them in the dissolved condition when added to the photographic emulsion and when drying them together with the gelatin to give a clear transparent layer. It has, therefore, already been proposed to disperse these water-insoluble or sparingly water-soluble dyestuff formers with suitable wetting or dispersing agents such as sulfurized high molecular weight hydroxy fatty acids and alcohols, high molecular weight aliphatic amines or resin soaps. The effect of these adding agents preferably is a physical one for they produce a strong decrease of the surface tension between the substance to be dispersed and the water as the solvent so that the substance is more intensely wetted whereby its emulsification is attained and its recrystallization or reseparation from the emulsion is prevented or at least made difficult. It is evident that the difficultly soluble dyestuff formers which are to be emulsified in this manner have a great tendency to separate from the solution so that it is necessary to add a considerable amount of dispersing agents to the photographic emulsion in order to render possible a separation and agglomeration of the dyestuff components. The photographic emulsion, however, is very sensitive to foreign substances. Moreover traces of crystals and flakes of the gelatin layer even if so small that they

can be scarcely distinguished with the naked eye cause much trouble in projection. It is, therefore, desirable to dissolve the water-insoluble dyestuff formers directly in the photographic emulsion.

Our present invention is based on the observation that water-insoluble or sparingly water-soluble dyestuff components can be dissolved in aqueous liquids without influencing their fastness to diffusion with respect to the binding agent (gelatin) of the emulsion by dissolving the components in water in the presence of bile acids or salts thereof, if necessary with an addition of organic solvents. It is sometimes helpful to warm the substances while dissolving them. The solution obtained can be added to a photographic emulsion or a gelatin solution without effecting a precipitation or a turbidity of these aqueous liquids. On drying the gelatin solution a layer clear as glass is obtained. By this invention it is accordingly possible to keep in solution dyestuff formers which have heretofore been thought useless since they could not be added in a dissolved condition to an emulsion due to their low solubility or their tendency to crystallize on drying the emulsion to give a layer. It is furthermore possible to form layers clear as glass with such dyestuff formers.

The dyestuff formers are conveniently dissolved together with the bile acid or a water-soluble salt thereof, if desired, with an addition of organic solvents or alkalis whereupon the solution thus obtained is mixed with the emulsion at any time prior to casting. For removing undesired substances the emulsion may be subjected to a washing with water after the solution of the dyestuff former is added. The solution of the dyestuff former may also be mixed with a gelatin solution whereupon, if necessary, after washing with water, the resulting solution is worked up into a silver halide emulsion.

The dyestuff formers used in the practice of this invention are, for instance, of the general types described in the following patents and applications:

U. S. Patents 2,186,852, 2,186,719, 2,186,734, 2,186,851, 2,186,733, 2,186,732, 2,186,847 dated January 9, 1940, U. S. Patents 2,179,238, 2,179,244, 2,178,612 dated November 7, 1939, French Patents 344,648, 344,649, 844,637, U. S. Patents 2,280,722, 2,292,575, 2,303,928 and 2,307,399 and U. S. Patent applications Ser. No. 284,258 filed July 13, 1939, Ser. No. 333,814 filed May 7, 1940, Ser. No. 335,144 filed May 14, 1940, Ser. No. 341,180 filed