

PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in Colour Photographic Elements

We, KODAK LIMITED, a Company registered under the laws of Great Britain, of Kodak House, Kingsway, London, W.C.2 (Assignees of KARL SCHINZEL, of Ottendorfergasse No. 12, Troppau (Silesia), Czechoslovakia, (formerly residing in Vienna, Austria), a Citizen of the Republic of Austria), do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in colour photographic elements, more particularly elements having three differentially colour sensitized silver halide layers coated on the same side of a single support.

In such three layer material the upper layer is generally blue-violet sensitive, the middle layer yellow and green sensitive, and the lower layer red sensitive. In order to limit diffusion to a minimum, it is advisable to make the two upper layers as thin as possible, about 0.005—0.01 mm. requiring the use of very fine-grain emulsions, relatively poor in silver, for three-colour reversal development.

If filter layers are interposed strongly swelling gelatine must be used for these so that the individual layers are spaced away from one another during the chemical reactions. These filter layers are kept so thin, 0.01 and less, that no undesirable increase of light scattering ensues, despite the fact that they may swell up tenfold. The lower layer can have the normal thickness of 0.02 mm. or for reversal development 0.01—0.015 mm. so that the total thickness of the three layers is about 0.025—0.04 mm. While the two upper layers require developers which intensively dye the image, less intensity is required for the lower layer, since this layer may contain considerably more silver halide than the upper and middle layers.

In order to obtain a vigorous, well-graded blue image, which is of primary importance for the character of the colour photograph, coating of the lower red-

sensitive emulsion (or infra-red sensitive for printing elements) of an average thickness of about 0.02 mm. using a highly sensitive emulsion of medium soft gradation, preferably sensitized only for red and orange, is recommended. Above this, a yellow and green-sensitive emulsion of medium sensitivity and a thickness of not more than 0.01 mm. is coated, and over that a not specially colour sensitized emulsion also of medium sensitivity and a thickness of 0.005—0.01 mm. For this purpose, a transparent, coarse-grain silver bromide emulsion can be used. Finest grain emulsions, are, however, to be preferred, because their blue and blue-green sensitivity can be strongly increased by modern sensitizers (see, for example, British Patent No. 376,746).

The order of the three layers just described can be changed, if a very sharp blue image is desired, by having the upper emulsion sensitivity to blue-violet, the middle emulsion to red and orange (or infra-red) and the lower emulsion to yellow and green; in which case they are developed lemon-yellow, green-blue and purple respectively.

This variation has been made possible by the fact that red sensitizers which do not sensitize to green and yellow but very strongly sensitize to the extreme orange red, in addition to the genuine red, for example 4:4'-dichloro-2':2':8-triethylthiacarbocyanine chloride, can now be made.

The insertion of a yellow filter, transmitting also red rays, between the blue-sensitive and the middle yellow-green or red-orange-sensitive layers is generally necessary for exposure purposes, even if the blue rays are generally absorbed by a yellow filter, because there are no means at present permitting complete suppression of the blue-sensitivity of the two other emulsions. A green filter between the middle and lower layers is generally unnecessary for exposure purposes, and a red-orange filter is very seldom required, since many of the present-day red-orange sensitizers are without effect in the green and yellow

parts of the spectrum.

The use of intermediate layers as colour filters is recommended, because strongly-swelling gelatine layers between the silver halide emulsion layers appear necessary for reasons of development-technique. It is usually sufficient to colour the gelatine layer adjacent to the blue-sensitive emulsion yellow, or also the blue-sensitive emulsion itself. The other intermediate gelatine layer, if it is present at all, may remain colourless, or may also be coloured yellow instead of red or green.

It has now been found that in a three-layer colour photographic element of the kind indicated above it is advantageous to have a layer containing sufficient colloidal silver dispersed in any emulsifying medium permeable to water to serve as anti-halation protection on either side of the support.

Such element may be used for the direct production of true-colour pictures or for the making of prints from Autochrome (Registered Trade Mark) or lenticular screen pictures especially those of the bi-pack process or to the printing of three superimposed images by means of three separation negatives or diapositives made from them or from a bi-pack with insertion of the corresponding filter or by projection on the chromoscope.

We are aware that in specification No. 385,832 there is described and claimed a manufacture of antihalation layers for

photographic materials which comprises the production of colloidal silver in a liquid binding agent such as gelatin solution and causing the liquid containing the gelatin to set, as well as a photographic material provided with an anti-halation layer comprising colloidal silver and a binding agent. So far as we are aware it has not heretofore been proposed to provide a colour photographic element having three differentially sensitized silver halide emulsion layers coated on the same side of a single support with an anti-halation layer composed of colloidal silver in an emulsifying medium.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A colour photographic element having three differentially colour sensitized silver halide emulsion layers coated on the same side of a single support and having on either side of the support a layer containing sufficient colloidal silver in an emulsifying medium permeable to water to serve as the anti-halation protection.

2. A photographic element as claimed in claim 1, having light filter layers between some or all of the emulsion layers.

Dated this 30th day of November, 1938.

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