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PHOTOGRAPHIC LAYERS AND PROCESS OF
MANUFACTURE THEREOF

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This invention relates to the manufacture of photographic layers. Gelatin is generally used as the binding agent in the preparation of such photographic layers, but as gelatin is an animal product its qualities vary to a great extent and it is therefore difficult to obtain gelatin layers of uniform and always reproducible qualities. It has already been proposed to replace the gelatin by artificial products; for instance, it has been proposed to employ as the binding agent a cellulose acetate which is hydrolysed to such an extent that it becomes soluble in water or at least soluble in mixtures of organic solvents and water containing a considerable quantity of the latter. Cellulose acetate hydrolysed to such an extent is, as is well known, not a uniform chemical compound but contains cellulose acetates of different degree of acetylation and also acetates of by-products resulting from partial destruction of the cellulose. Therefore, photographic layers produced from such cellulose acetates show the same disadvantages as gelatin layers. Furthermore, it has been proposed to replace the gelatin by water-soluble cellulose ethers such as methyl cellulose or hydroxy alkyl ethers of cellulose, and by water-soluble condensation products such as, for instance, polyacrylic acids.

It has now been found that the gelatin can be replaced advantageously by such cellulose ethers as contain at least one free carboxylic or sulphonic acid group and which are water-soluble, or at least easily swell in water, without being previously hydrolysed; also the water-soluble salts of such cellulose derivatives can be employed.

The present invention therefore relates to photographic materials containing special binding agents. The photographic material according to the present invention comprises binding agents, which, partly or entirely, consist of carbohydrate ethers containing at least one free carboxylic or sulphonic acid group, or of water-soluble salts of such carbohydrate ethers.

For instance, cellulose acetic acid usually also referred to as cellulose glycollic acid or its sodium or ammonium salt is very suitable for this purpose. Furthermore the higher homologues of cellulose glycollic acid, such as cellulose propionic acid, and the corresponding derivatives of other carbohydrates such as starch, dextrines and similar compounds can be employed. Cellulose ether esters, as for instance, cellulose acetate glycollic acid may also be used. Suitable cellulose derivatives containing sulphonic acid groups are, for instance, the compounds described in British Patent Specification No. 479,316. Compared with the cellulose ethers suggested for this purpose, such as methyl cellulose, these compounds have the advantage that they contain an acid group, an advantage which is especially useful in the forming of layers for color photographic purposes. The use of the above mentioned cellulose

derivatives for the manufacture of the supports of photographic layers has already been described but not for the manufacture of the layers themselves.

Example

50 ccs. of a 1.5% aqueous solution of the sodium salt of cellulose glycollic acid are added to 50 ccs. of a not specially sensitized silver bromide emulsion containing 10% gelatin. The whole is thoroughly mixed and coated onto a surface of 0.2 square metre.

The light-sensitivity of the layer thus obtained shows no difference compared with the light-sensitivity of a photographic layer prepared from a normal silver bromide gelatin emulsion containing gelatin alone as binding agent.

To facilitate the drying and to improve the quality of photographic materials prepared with the employment of the new binding agents according to the present invention, it is sometimes advisable to add wetting agents to the emulsion or to the binding agent solution.

The new binding agents can be employed in the same manner as gelatin, replacing the gelatin partly or entirely. The layers containing them can be colorless or colored and they may contain light-sensitive silver salts and if necessary, sensitizers. They are especially useful for employment in color photographic single- or multi-layer materials. The new layers can be hardened by the same methods hitherto used for the hardening of the gelatin layers, for example, by employing formaldehyde as the hardening agent.

1. A photographic layer comprising a light-sensitive silver halide and a binding agent therefor comprising essentially a mixture of gelatin and a cellulose glycollic acid.

2. A photographic layer comprising a light-sensitive silver halide and a binding agent therefor comprised essentially of cellulose glycollic acid.

3. A photographic layer comprising a light-sensitive silver halide and a binding agent therefor comprising essentially at least one member selected from the group consisting of cellulose glycollic acid, water soluble salts of cellulose glycollic acid, cellulose propionic acid, cellulose acetate glycollic acid and mixtures of any of these with gelatin.

4. A photographic multilayer material comprising a plurality of superposed layers on a common support, one of said layers comprising a light-sensitive silver halide and a binding agent therefor comprising essentially at least one member selected from the group consisting of cellulose glycollic acid, water soluble salts of cellulose glycollic acid, cellulose propionic acid, cellulose acetate glycollic acid and mixtures of any of these with gelatin.

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