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LIGHT-SENSITIVE MATERIAL AND METHOD OF MAKING THE SAME

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My invention relates to light-sensitive layers sensitized with a water soluble iron salt and to a method of making the same.

The main object of my invention is to provide a simple, inexpensive and reliable method of making such layers.

A further object is to produce a material in which the light-sensitive layer is protected from premature development and damage due to mechanical abrasion.

Further objects will appear as the description progresses.

In accordance with the invention I form a light-sensitive layer on a support by placing a finely-divided water-soluble light-sensitive iron salt in suspension in a solution of a water-insoluble binder in a volatile organic liquid, applying this dispersion in a layer on the support and removing the organic liquid by volatilization.

In one embodiment of the invention I suspend in the solution to be applied also a substance necessary for the development of the image. In such cases it is necessary to employ only those combinations of iron salts and developing substances which do not react prematurely even in the presence of the organic liquid. When these precautions are taken there is considerably less danger of a premature reaction than when a water-soluble binder, such as gelatine, is used.

In carrying out the invention I prefer to use those organic liquids with which it is possible to produce a suspension which can be readily homogenized after the suspended material has settled out during storage. Such suspensions can be made in known manner by grinding the material to be suspended with the suspension medium in a ball mill.

In spite of the fact that the binder of the light-sensitive layer according to the invention is water-insoluble, the formation of the coloring material necessary for the development of the image can be readily effected by an aqueous medium provided the layer is made in a suitable thickness. The use of a thin layer has the advantage that it makes it possible to obtain stronger contrasts and sharper images.

The use of suspensions according to the invention has the further advantage that it is possible to obtain wide variations in the concentrations and therefore one is not limited to the solubility of the image-forming substances when obtaining a concentration necessary to secure sharply-defined contrasts.

The method according to the invention has the advantage that it can be carried out in a simple manner and it is well adapted for use with supports of substantially water-proof material.

In order that the invention may be clearly understood and readily carried into effect I shall describe the same in more detail by means of several specific examples.

Example I

I form a suspension by placing 5 grs. of finely-divided brown ferric ammonium citrate and 4 grs. of finely-divided potassium ferricyanide in suspension in 100 c. c. of carbon tetrachloride in which 5 grs. of cellodammar resin is dissolved. I apply a layer of this suspension upon the surface of an aluminium plate, place the plate in a furnace heated to about 80° C., and remove part of the solvent by vaporization while moving the plate back and forth. I then pour off the excess suspension and subsequently remove the remaining solvent by volatilization.

After exposing the sensitized material under a negative for such a long time that a basis is laid for a positive image, I rinse the same with water whereby a blue positive image is produced.

Example II

I form a suspension by placing 10 grs. of finely-divided brown ferric ammonium citrate, 4 grs. of finely-divided silver nitrate, 1 gr. of finely-divided citric acid and 2 grs. of finely-divided oxalic acid in suspension in 100 c. c. of carbon tetrachloride in which 5 grs. of cellodammar resin are dissolved. An aluminium plate is provided with a coating of the above suspension in the manner described in Example I. The resulting light-sensitive material is exposed in the manner described in Example I and rinsed with water to obtain a grayish-black positive image.

Example III

I form a suspension by placing 8 grs. of a finely-divided ferric ammonium oxalate, 4 grs. of finely-divided potassium ferric citrate and 1 gr. of finely-divided oxalic acid in suspension in 100 c. c. of benzene in which 5 grs. of cellodammar resin is dissolved. This suspension is applied to an aluminium plate and the solvent is removed in the manner explained in Example I.

After the resulting light-sensitive material has been exposed in the manner described in Example I, I bathe the same for several minutes in a solution of 1% of ammonium persulphate in water and then rinse the same with water to obtain a blue positive image from the negative.

Example IV

I form a suspension by placing 8 grs. of finely-divided green ferric ammonium citrate in suspension in 100 ccs. of ethanol in which 5 grs. of a polymerized vinyl acetic ester, known under the trade name "Vinnapaas B," is dissolved. To this suspension I add 2.5 grs. of silver nitrate and 1.5 gr. of tartaric acid. An aluminium plate is provided with a layer of the above suspension and the solvent is removed in the manner described in Example I. The light-sensitive material is exposed in the manner described in Example I and is then rinsed with water to obtain a grayish-black positive image from the negative.

In order to protect the images formed by the methods described above from mechanical damage I prefer to apply to the surface thereof after exposure, a layer of protective material, for example Celluloid lacquer.

Although in the above examples I have referred to the supports of aluminium, it is possible to use supports of other metallic materials which are not affected to any appreciable extent by the substances to be used, for example silver, silver-plated metals and stainless steel.

In addition to being of metal the supports may be of other materials such as glass, acetyl cellulose, rubber, rubber derivatives such as the product known as "Pliofilm" which is particularly impermeable to water, paper, etc.

Instead of using cellodammar resin as the binder I may use other substances or mixtures thereof, such as polymerized hydrocarbons, for example polysterene, polymerized unsaturated fatty acid esters, derived for example from acrylic acid and its homologues, vinyl acetic acid or the like, artificial and natural resins and gums, such as ester gum, mastic and collophony.

As organic volatile solvents in which the above binders are generally readily soluble and which can be used in carrying out the invention I may mention substances such as benzene, toluene or the like in addition to chlorinated hydrocarbons, such as trichlorethylene and carbon tetrachloride.

Although I have described my invention with reference to specific examples and applications I do not desire to be limited thereto because obvious modifications will appear to one skilled in the art.

What I claim is:

1. In the manufacture of light-sensitive material, the steps of applying to the surface of a support a suspension of a water-soluble light-sensitive iron salt in a solution of a water-insoluble binding agent in a volatile organic liquid in which the iron salt is insoluble, and removing the organic liquid by volatilization.

2. In the manufacture of a light-sensitive material, the steps of applying to the surface of a support a suspension of a water-soluble light-sensitive iron salt and a substance necessary for development in a solution of a water-insoluble binding agent in a volatile organic liquid in which the iron salt and substance are insoluble, and removing the organic liquid by volatilization.

3. In the manufacture of light-sensitive material, the steps of applying to the surface of a support of substantially water-proof material a suspension of a water-soluble light-sensitive iron salt in a solution of a water-insoluble binding agent in a volatile organic liquid in which the iron salt is insoluble, and removing the organic liquid by volatilization.

4. A light-sensitive material made by the method of claim 1 and comprising a support, a layer of a water-insoluble binder material adhering to a surface of said support, and a water-soluble light-sensitive iron salt in a mechanically-divided state suspended in and homogeneously distributed throughout said layer.

5. A light-sensitive material made by the method of claim 1 and comprising a support of substantially water-proof material, a layer of a water-insoluble binder material adhering to a surface of said support, and a water-soluble light-sensitive iron salt in a mechanically-divided state suspended in and homogeneously distributed throughout said layer.

6. A light-sensitive material made by the method of claim 1 and comprising a support, a layer of a water-insoluble binder material adhering to a surface of said support, a water-soluble light-sensitive iron salt, and a substance necessary for the development of the image, said salt and substance in a mechanically-divided state suspended in and being homogeneously distributed throughout said layer.

7. A light-sensitive material comprising a paper support, a layer of a water-insoluble binder material adhering to a surface of said support, and a water-soluble light-sensitive iron salt in a mechanically-divided state suspended in and homogeneously distributed throughout said layer, said iron salt being readily removable from the support by agitating the material in a solvent in which the binder is soluble and the iron salt is insoluble.

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