

UNITED STATES PATENT OFFICE

KENNETH C. D. HICKMAN AND LUDWIG A. STAIB, JR., OF ROCHESTER, NEW YORK,
ASSIGNORS TO EASTMAN KODAK COMPANY, OF ROCHESTER, NEW YORK, A CORPO-
RATION OF NEW YORK

LIGHT SENSITIVE TROPOCHROMIC COATING

No Drawing. Application filed August 7, 1930. Serial No. 473,785.

This invention relates to tropochromic coatings, and in particular to tropochromic coatings which are sensitive to light.

The object of this invention is to provide improved sensitivity and particularly light sensitivity in paper and other supports coated with tropochromic mixtures of the kind disclosed in our co-pending application, Serial No. 473,784, filed August 7, 1930.

The term "tropochromic" is used throughout this specification to denote any layer containing substances which have an inherent ability to change color when suitably stimulated. Tropochromic layers are well known, and in fact, most photographic reproducing materials have light sensitive tropochromic layers. The word "tropochromic" is used to denote the ability to change color and does not specify the kind of stimulus, whether light, heat, electricity, or chemical environment, which induces the change.

The tropochromic coatings referred to in our co-pending application consist of an organic substance capable of yielding a sulfide-ion and a metal salt capable of yielding a colored metal sulfide.

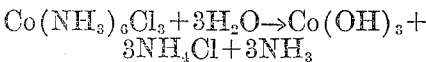
We have found that the reaction between such an organic compound and such a metal salt is very sensitive to changes of pH. In general, the substances do not react in acid solution but they form the colored sulfide when the solution becomes alkaline. Coated layers maintained slightly acid remain substantially colorless, whereas coated layers rendered alkaline soon darken from the formation of sulfide.

As an example, we may cite the reaction between lead acetate and thioacetamide which takes place readily to produce lead sulfide in solutions slightly alkaline to litmus.

According to the present invention we incorporate with the organic sulfide-metal salt tropochromic layer, described in our said application, an additional substance which becomes more alkaline or liberates ammonia or an alkali under the action of light.

A number of these substances are known.

Thus, it was discovered by Schway and Kronig, Berichte der Deutschen Chemischen Gesellschaft, 56, 211 (1923), that hexamino cobaltic chloride under the action of light decomposed, probably in the following manner:



We have found that when hexamino cobaltic chloride is added to a tropochromic layer consisting of thioacetamide and lead acetate the layer becomes very sensitive to light with the production of a brown image of lead sulfide where light has acted. Paper coated with such a mixture can be exposed under a "negative" or a line drawing and will yield an image which may be fixed with a short washing in water.

A satisfactory light sensitive paper has the following composition:

Gelatin 5%-----	40.0 c. c.
Lead acetate-----	2.5 grams
Thio-acetamide-----	1.0 gram
Hexamino cobaltic chloride-----	1.0 gram

To the above is added a trace of either acetic acid or sodium or potassium acid sulfate. A small amount of glycerine or other hygroscopic material may be added with beneficial results, causing the paper to be developed with greater ease.

This particular paper has advantages for printing-out paper, and particularly for a draftsman's printing paper.

Another ammonia bearing substance which causes the sulfide tropochromic layer to darken in light is aquo pentamino cobaltic chloride. A satisfactory coating can be made from:

Gelatin-----	0.1 gram
Lead acetate-----	2.5 grams
Thioacetamide-----	1.0 gram
Aquo pentamino cobaltic chloride--	1.0 gram
Water-----	20.0 c. c.

Certain chromamines are equally effective, notably hexamino chromic chloride which may be substituted for the cobaltic salt in the above formula.

Reference to the chemical literature shows that many of the complex metal amines, substituted amines, and their salts, are light sensitive, and can thus be used according to this invention. This invention considers within its scope the use of any compound which under the action of light becomes sufficiently alkaline to cause the darkening of tropochromic layers of the kind referred to in our co-pending application. The use of hexamino cobaltic chloride, aquo pentamino cobaltic chloride, and hexamino chromic chloride are shown by way of example only.

We consider as included within our invention all variations and equivalents coming within the scope of the appended claims.

What we claim is:

1. A photographic support having a coating containing a salt of a metal which in the presence of free sulphur ions forms a colored sulphide, an organic compound capable of yielding a sulphide ion, and including a compound which under the influence of light yields a substance capable of promoting the reaction between the first two compounds to form a visible image.

2. A tropochromic coating consisting of an organic substance containing available sulfur, a metal salt which in the presence of free sulphur ions forms a visible sulphide, and a light sensitive substance which under the action of light causes an alkaline reaction in the tropochromic layer.

3. A tropochromic coating consisting of an organic substance containing available sulfur, a metal salt which in the presence of free sulphur ions forms a visible sulfide, and a light sensitive substance which causes the mixture to yield a colored sulfide where light has acted.

4. A light sensitive coating consisting of lead acetate, thioacetamide and hexamino cobaltic chloride.

5. A light sensitive coating consisting of aquo pentamino cobaltic chloride, thioacetamide, and lead acetate.

6. A light sensitive coating consisting of thioacetanilide, lead acetate, and hexamino chromic chloride.

7. A light sensitive tropochromic coating comprising aquo pentamino cobaltic chloride, thioacetamide and a metal salt which in the presence of free sulfur ions forms a metal sulfide.

Signed at Rochester, New York this 2nd day of August 1930.

KENNETH C. D. HICKMAN.
LUDWIG A. STAIB, Jr.