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DIAZOTYPE COATING SOLUTION
FOR PLASTIC CARRIERS

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This invention relates to diazotype coating solutions.

Many processes have been suggested for the production of photoprinting material, such processes differing principally in the chemical used as the light sensitive element and in the manner of developing a dye image. The most widely known of these processes are those which are based upon the light sensitivity of aromatic diazo compounds. Other such processes of less importance include processes based upon the light sensitivity of the leuco compounds of the coal tar dyestuffs; processes based upon the oxidizing action of o-nitro groups in aromatic systems having aliphatic side chains, as for instance o-nitrophenyl lactic acid methylketone; and processes based upon the light sensitivity of the o-nitro-diaminotriphenyl-methane bases. With the exception of the processes based upon the light sensitivity of aromatic diazo compounds, these suggested photoprinting processes for the reproduction of positive copies from positive originals have found no commercial adaptability either because of the instability of the compounds employed or the difficulty of developing the dye image from the undecomposed light sensitive material. The aromatic diazo compounds have found wide commercial acceptance in two well known processes which are designated respectively as the one-component or wet-development process, and the two-component or dry-development process.

In the one-component process, the aromatic diazo compound is incorporated into a light sensitive layer on the carrier which may be paper, foil, glass, textile material, or a metallic surface, and after exposure under the original to be copied is developed by contact with a solution of the coupling component necessary to produce the ultimately desired image.

In the two-component process, the aromatic diazo compound and the coupling component necessary to produce the dye image are both incorporated in the light sensitive layer on the carrier. In this case, the development of the dye image is effected after exposure by contacting the light sensitive layer with ammonia gas. For optimum results, it is usually necessary to limit the selection of the diazo compound to the diazo compounds derived from aromatic p-diamines and o-aminonaphthols, although some others have been found suitable. However, this invention is not concerned with the selection of any particular diazo or class of diazo compounds. If the diazo compound is suitable for a two component system, it is suitable for the purpose of this invention.

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In photoprinting processes of this type, it is highly desirable to produce a copy which will have a distinctive color preferably of a dark shade on a clear white background so that the image will be sharp. It is also desirable to have a material which will give a gradation of shade throughout the high light and half tone areas.

The coupling components must be stable and fast to light. They should be reasonably soluble in water, yet the dyestuff produced therefrom should be water insoluble. Only few serviceable compounds are available as coupling components, such as phenols, substituted aminophenols, naphthols, diketones, sulfones, and acetoacetanilides.

When coating or impregnating plastic materials such as cellulose acetate, ethyl cellulose or regenerated cellulose, it is customary to use, in addition to the active solvent for the non-polar components, sufficient water to dissolve the polar components of the diazotype formula. Usually, the water seriously diminishes or completely destroys the solvent power of the active solvent. To insure sufficient power of the diazotype solution, it is necessary to load the solution with the solid components of the diazotype formula, which results in the formation of a surface film or scum on the plastic base.

An object of the present invention is to provide new diazotype coating solutions which can be applied to a suitable plastic base or carrier without formation of the undesirable scum.

I have discovered that a coating solution containing an aliphatic halohydrin can advantageously be used to coat or impregnate a plastic base or carrier, such as cellulose esters, particularly cellulose acetate, ethyl cellulose, regenerated cellulose, and cellulose ethers with excellent results.

I have also discovered that a diazotype solution containing an aliphatic halohydrin and water gives excellent results when coating a plastic material such as cellulose acetate, ethyl cellulose, and regenerated cellulose, and that no undesirable scum is formed. The high tolerance for water of aliphatic halohydrin solutions allows wide adjustments in solvent balance, thereby minimizing fire hazard, without appreciably sacrificing volatility and solvent action. The good solvent power of these halohydrins permits the use of a diazotype coating solution having a minimum amount of solid materials and enables formation of scum-free diazotype coatings on plastic surfaces.

Such aliphatic halohydrins may be, for example, ethylene chlorhydrin and propylene chlorhydrin. Any light sensitive diazonium compound which will couple to produce the desired shade

may be used in a one-component system. In a two-component system a diazotized p-phenylene diamine, an o-amino phenol, o-amino naphthol, or 3-aminocarbazole or other suitable diazo compound may be used.

In a preferred embodiment the process of this invention is carried out by dissolving a light sensitive diazonium compound, an azo component, an aliphatic chlorhydrin, a mild acid such as citric acid and thiourea to form a coating solution. This solution is coated on a suitable base such as a cellulose ester film, a regenerated cellulose film, an ethyl cellulose film or a gelatinized surface in the usual manner by applying the coating solution to the base or carrier with a doctor blade, by spraying, or by impregnation. The coated material is then dried, exposed in contact with an original positive or negative picture or drawing, and developed by treatment with ammonia vapor or other suitable alkaline materials. As a diluent for the coating solution, organic solvents of high volatility, such as alcohols, ethers and ketones may be used.

In another manner of carrying out this process, a light sensitive diazonium compound is added as the only dye component to the mild acid aliphatic halohydrin and coated onto a carrier. The exposure in contact with a suitable original is effected as above, but the image is developed by bathing the exposed element in an alkaline bath containing the coupling component necessary to combine with the undecomposed diazonium compounds to form a dye in the exposed areas.

In still another manner of carrying out this process a light sensitive diazonium compound, citric acid, thiourea, an azo component and water are added to the aliphatic halohydrin, and this solution is coated on a suitable base, preferably a plastic base such as cellulose acetate, ethyl cellulose or regenerated cellulose. After drying, the sensitized base is exposed in contact with an original as above, and developed by means of ammonia vapor.

Although it is not essential, it is understood that, if desired, auxiliary materials may be added to the coating solution in any of the modifications of this process, which materials may function as stabilizers, preservatives, extenders, color-intensifiers and light sensitive intensifiers.

A wide range of colors may be produced by this process. By proper selection of the coupling component and the diazonium compound, an image can be reproduced in almost any desired color.

The practice of this invention may be best understood by reference to the following specific examples, which are presented as illustrative of the invention without any intention of introducing limitation. Unless otherwise stated, the parts are given by weight.

Example 1

A coating solution was prepared which contained:

- 50 cc. of water
- 20 cc. of ethylene chlorhydrin
- 5 cc. of butanol-1
- 10 parts tartaric acid
- 5 cc. formic acid
- 10 parts resorcinol
- 16 parts zinc chloride double salt of p-diazo N-monoethyl-2-methylaniline
- 1 part saponin

A cellulose acetate foil was impregnated with this coating solution, and the foil dried in the usual manner. Upon placing the foil in contact with an original, which it was desired to copy, and exposing it to light, followed by a subsequent development with gaseous ammonia, an orange colored image of good brilliance was obtained.

Example 2

20 cc. of propylene chlorhydrin was substituted for the 20 cc. of ethylene chlorhydrin in the coating solution of Example 1. A regenerated cellulose foil was impregnated with this solution, dried, exposed to light, and developed as in Example 1. An orange colored image of good brilliance was obtained.

I claim:

1. A diazotype aqueous coating solution for plastic carriers of the class consisting of regenerated cellulose, cellulose esters, and cellulose ethers comprising a light sensitive diazo compound and an aliphatic halohydrin of the class consisting of ethylene chlorhydrin, and propylene chlorhydrin.

2. A diazotype aqueous coating solution for plastic carriers of the class consisting of regenerated cellulose, cellulose esters, and cellulose ethers comprising a light sensitive diazo compound and ethylene chlorhydrin.

3. A diazotype aqueous coating solution for plastic carriers of the class consisting of regenerated cellulose, cellulose esters, and cellulose ethers comprising a light sensitive diazo compound and propylene chlorhydrin.

4. A diazotype aqueous coating solution for plastic carriers of the class consisting of regenerated cellulose, cellulose esters, and cellulose ethers comprising a light sensitive diazo compound suitable for a two-component system, an azo dye coupling component, and an aliphatic halohydrin of the class consisting of ethylene chlorhydrin and propylene chlorhydrin.

5. A diazotype aqueous coating solution for plastic carriers of the class consisting of regenerated cellulose, cellulose esters, and cellulose ethers comprising a light sensitive diazo compound suitable for a two-component system, an azo dye coupling component and ethylene chlorhydrin.

6. A diazotype aqueous coating solution for plastic carriers of the class consisting of regenerated cellulose, cellulose esters, and cellulose ethers comprising a light sensitive diazo compound suitable for a two-component system, an azo dye coupling component and propylene chlorhydrin.

7. A diazotype aqueous coating solution for a cellulose acetate carrier comprising a diazo derivative of a p-phenylene diamine, an azo dye coupling component, and ethylene chlorhydrin.

8. A diazotype aqueous coating solution for a regenerated cellulose carrier comprising a diazo derivative of a p-phenylene diamine, an azo dye coupling component, and propylene chlorhydrin.

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REFERENCES CITED

The following references are of record in the file of this patent:

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