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HEAT DEVELOPABLE DIAZOTYPE COPY PAPER

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ABSTRACT OF THE DISCLOSURE

In a heat developable diazo copy paper containing a heat fugitive acid or salt, there is incorporated in the light sensitive layer in accordance with the present invention, an amide of olefinmonocarboxylic acid or its derivative, to inhibit the yellowing of the print developed from said paper. Also, there is incorporated in this light sensitive layer a urea or its derivative to inhibit the fading of the images on the print developed from the copy paper.

This invention relates to a heat developable diazotype copy paper comprising a diazonium salt, a coupler, an acid stabilizer, the salt of trichloroacetic acid as a heat fugitive acid, and other sub-stabilizer. It relates more particularly to a heat developable diazotype copy paper which in accordance with the present invention, has, in its light sensitive layer, amide of olefinmonocarboxylic acid selected from the class consisting of acrylamide, methylolacrylamide, α-ethylacrylamide, and β-methyl crotonamide and urea or its derivative selected from the class of urea, methylurea, ethylurea and ethyleneurea.

The primal object of this invention is to prevent, in prints made from a heat developable diazotype copy paper, a fading characteristic of the developed image and a yellowing propensity of the background, which are incidental with employment of salt of trichloroacetic acid as a heat fugitive acid in a heat developable diazotype copy paper.

Another object of this invention is to provide a heat developable diazotype copy paper which is capable of producing bright and distinct dye images. As known to those who are skilled in the art, use of a salt of trichloroacetic acid as a heat fugitive acid in a heat developable diazotype copy paper, has several practical objections. The deficiencies are caused as the heat fugitive acid, which is activated by light and heat, acts on a decomposite of diazo compound and coupler reactant. These undesirable phenomena are more apt to be observed when pH value is higher.

Numerous attempts have been made in the prior art to obviate some of these deficiencies. Thus, it has been proposed to apply as the heat fugitive acid, the salt of trichloroacetic acid selected from the class consisting of sodium, potassium, ammonium, ethanolamine and guanidine. However, this acid is found ineffective to overcome the aforementioned drawbacks.

Hence, an object of the present invention is to eliminate the aforementioned deficiencies without harming the properties of copy paper. This is accomplished by adding an amide of olefinmonocarboxylic acid selected from the class consisting of acrylamide, methylolacrylamide, α-ethylacrylamide and β-methylcrotonamide and urea or its derivative selected from the class consisting of methyl

urea, ethylurea and ethyleneurea to the light sensitive layer of the heat developable copy paper containing as the heat fugitive acid, the salt of trichloroacetic acid selected from the class consisting of sodium, potassium, ammonium, ethanolamine and guanidine salt. The addition of amide of olefinmonocarboxylic acid selected from the class consisting of acrylamide, methylolacrylamide, α-ethylacrylamide and β-methylcrotonamide, produces a remarkable effect in preventing the background of prints from turning yellowish. Adding amounts may be variable from twice to 15 times the amount of diazo compound used and the most striking results are obtained when the adding amount is between twice and 4 times of the diazonium salt, while relatively large amounts of addition cause detrimental effect on the image density.

Image fading can be considerably reduced when urea or its derivatives, selected from the class consisting of methylurea, ethylurea, and ethyleneurea, its applied concurrently with the addition of the amide of olefinmonocarboxylic acid selected from the class consisting of acrylamide, methylolacrylamide, α-ethylacrylamide and β-methylcrotonamide. The maximum effect is observed when the amounts of the former is half of that of the latter.

Furthermore, experiments proved that amide of olefinmonocarboxylic acid or its derivative and urea or its derivative used in this invention had no effect upon storage life of the copy paper, but rather, because of the urea or its derivative, image density of the print was considerably improved. The background of the prints made from copy paper containing no materials such as mentioned above turned yellowish when left in a room for 3 to 4 days under normal conditions and after 2 to 3 months the image fading occurred.

No yellowing phenomenon of the background after the lapse of 3 months, nor image fading after 6 months, was observed with the prints made from copy paper containing aforesaid materials of this invention.

The mechanism by which this invention works, particularly in the effective prevention of the aforementioned deficiencies, is not yet certain. However, it is evident that the action of the heat fugitive acid, i.e. the salt of the trichloroacetic acid activated by light and heat, upon the reactant between decomposite of diazonium salt and coupler is prevented by the action of the functional group of the activated heat fugitive acid.

For the better understanding of the present invention, the following illustrative but non-limiting examples thereof are given:

EXAMPLE 1

Water—100 ml.
p-Methylhydroxy-ethylaminobenzenediazonium zinc chloride—1.0 gr.
2,3-dihydroxynaphthalene-6-sodiumsulphonate—3.0 gr.
Sodium trichloroacetate—6.0 gr.
Cyanoguanidine—1.5 gr.
Tarataric acid—0.5 gr.
Acrylamide—3.0 gr.
Urea—1.5 gr.
Saponin—0.1 gr.

The light sensitive solution of the above formulation was coated on a base such as paper. The dried material was then exposed to ultraviolet rays under an opaque

image in the same way as conventional diazotype material to obtain a latent image. By passing such exposed material for 2 to 3 seconds under the heat of 150° C., a clear blue image was obtained.

Results of a forced fading test run on the prints made from the above material and those made from the prior arts are shown in the following table. Image density was measured by a reflection densitometer (made by Photovolt Corp.) after exposing the samples with carbon arc as a light source under ambient temperature of 40° C. using a fadeometer (made by Tokyo Rika Co.).

	Image density	Background density
Prior arts:		
Before testing	1.0969	0.1135
After test	0.8861	0.1938
Example 1:		
Before testing	1.1249	0.1163
After test	1.0969	0.1249

EXAMPLE 2

Water—100 ml.
p-Methylhydroxy-ethylaminobenzenediazonium zinc chloride—1.0 gr.
2,3-dihydroxynaphthalene-6-sodiumsulphonate—3.0 gr.
Triethanolamine-trichloroacetate—6.0 gr.
Cyanoguanidine—1.5 gr.
Tartaric acid—0.7 gr.
Methylolacrylamide—4.0 ml.
Urea—2.5 gr.
Saponin—0.1 gr.

The above formulation was coated on a base such as paper and the procedure of Example 1 was repeated. The results were essentially the same.

I claim:

1. A heat developable diazotype material comprising a support having a coating thereon, said coating containing a diazonium compound, a coupler, an acid stabilizer, and a salt of trichloroacetic acid as a heat fugitive acid, said salt being of the class consisting of the sodium, potassium, ammonium, ethanolamine and guanidine salts, said paper being characterized by the addition to said layer of an amide of olefinmonocarboxylic acid of the class consisting of acrylamide, methylolacrylamide, α-ethylacrylamide and β-methylcrotonamide and a urea or urea derivative compound of the class consisting of urea, methylurea, ethylurea and ethyleneurea, said amide and said urea or its derivative being present in proportions to inhibit substantially the fading of images in the prints developed from said paper, and yellowing of the prints.

2. A heat developable diazotype material as described in claim 1, said amide being present in the proportions by weight of about two to fifteen times the amount of diazonium compound.

3. A heat developable diazotype material as described in claim 1, said amide being present in the proportions by weight of about two to four times the amount of the diazonium compound.

4. A heat developable diazotype material as described in claim 1, said urea or its derivative compound being present in the light sensitive layer in the proportions by weight of about 50% to 62% of the amount of said amide.

5. A heat developable diazotype material as described in claim 1, said amide being present in the proportions by weight of about two to fifteen times the amount of diazonium compound, said urea or its derivative compound being present in the light sensitive layer in the proportions by weight of about 50% to 62% of the amount of said amide.

6. A heat developable diazotype material as described in claim 1, said amide being present in the proportions by weight of about two to four times the amount of diazonium compound, said urea or its derivative compound being present in the light sensitive layer in the proportions by weight of about 50% to 62% of the amount of said amide.

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