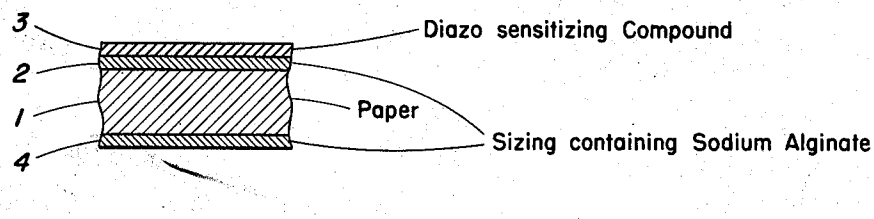
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ALGINATE SIZED DIAZOTYPE SENSITIZED MATERIAL

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ALGINATE SIZED DIAZOTYPE SENSITIZED MATERIAL

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This invention relates to photosensitive papers and more particularly to the manufacture of improved papers designed for use with diazotype sensitizing layers.

An object of this invention is the production of diazotype papers in which penetration of the sensitizer components is more even and in which there are less voids and deep spots

A further object of the invention is the production of a diazotype paper which gives a dye image of markedly increased visual density.

In the manufacture of papers designed for use with diazotype layers, it is customary to use a surface sizing of a starch. For this purpose there is employed starch, or modified or converted starch, such as enzyme-hydrolized or chlorinated starch. In practice, the starch is cooked to a smooth consistency, and if desired, there may be added materials to control pH during conversion, such as calcium carbonate. In addition, soaps may be added as, for example, sodium oleate, if it is desired to increase the viscosity. The viscosity of the sizing bath is such as will permit ready application by the sizing machine and penetration into the paper.

In practice, the starch size is applied by dipping the paper off the paper machine or just prior to the rewinder of the paper machine, into the starch bath, after which the paper is dried with gentle heat. If desired, this process may be repeated to build up a surface size of any desired thickness and the thus sized paper may be subsequently super-calendered in order to give it a smooth finish.

The above mentioned surface starch size is employed in addition to the usual beater size which is added to the paper pulp in the beater prior to the formation of the paper. This beater size may be the conventional aluminum resinate and/or wax sizes, for instance.

While the object of the starch size is to improve the uniformity of the surface particularly with regard to imbibition of the sensitizing chemicals, the process has been accompanied by various objectionable features. Among these are the unevenness of penetration of the sensitizing chemicals and the formation of voids or deep spots in the surface. The voids or breaks in the size surface cause "speckling" of the dye image due to uneven penetration of the dye components. Furthermore, the visual density of the dye image is relatively low.

According to my invention, I have found that by employing sodium alginate in place of all or part of the starch normally used heretofore for

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surface sizing of the paper, highly desirable improvements are made in the properties of the paper with respect to the photosensitive chemicals employed in preparing diazotype materials. First of all, the evenness of penetration of the sensitizing chemicals is highly improved and less voids or deep spots occur in the surface. In addition, the dye components have a greater substantivity for the sodium alginate and the visual density of the dye is markedly increased, thereby giving images of improved sharpness, clarity and definition.

The figure of the drawing gives a diagrammatic illustration of the diazotype sensitized material of the invention.

I do not know to what mechanism the improved results which I obtain by the use of sodium alginate are attributable, but I believe, without being bound thereby, that the increased viscosity of this colloid and its salt-like nature may be contributing factors. I have also noted that the sodium alginate has an added substantivity for the dye components and that this might explain the improvement in the visual density of the dye formed when the diazo-sensitized layer is exposed and developed.

The following examples will serve to illustrate my invention although it is to be understood that the invention is not limited thereto.

Example 1

A warm sizing bath is prepared by dissolving in water and cooking the necessary amount of chlorinated starch to produce a 4% solution. To this solution there is added 1% of sodium alginate. The warm solution may then be applied to a sheet of paper in any conventional way and the surface size produced thereon is then air dried. A satisfactory method of applying the size is to pass the paper between nip rolls which are immersed in the sizing solution. A coating of any desired thickness may be applied.

Any of the known diazotype sensitizers is then applied to the sized paper. The sensitizer and coupling component may be applied separately or together as is known in the art. In the latter case, the papers are developed after exposure by treatment with a solution of an alkali or by exposure to an atmosphere containing ammonia or other alkaline vapor.

Referring to the figure of the drawing, the diazotype sensitized material of this example contains a sizing layer made up of chlorinated starch and sodium alginate.

Example 2

A warm sizing bath is made by dissolving and cooking the necessary amount of low viscosity enzyme-hydrolyzed starch to produce a 5% solution. To this solution is added 1% of sodium alginate and 1% of sodium oleate. The warm solution is then applied to either one or both sides of the paper in the same manner as in Example 1. The sized paper is then sensitized with any of the well-known diazo sensitizer solutions.

Instead of replacing part of the starch in the sizing solution by the sodium alginate, all of the starch may be replaced thereby. In this case, the procedure, as illustrated by the following examples, is employed.

Example 3

A 0.5 to 1% sodium alginate solution is prepared by dissolving the sodium alginate in water. This solution is then coated on to a sheet of paper and dried. The paper is then sensitized with any suitable diazo sensitizing solution.

Referring to the figure of the drawing, the diazotype sensitized material of this example contains a sodium alginate sizing layer.

Example 4

A 1% solution of sodium alginate is prepared as in Example 3 and this is then coated onto a sheet of paper as in Example 1. The paper is then sensitized prior to drying the sodium alginate size. The greatest improvement in dye penetration is obtained when the sensitizer is applied prior to drying of the size. Hence, this is the preferred mode of operation.

In a modification of the process, the sodium alginate size may be applied to a finished paper in the same manner as in Examples 3 and 4. By finished paper, I mean paper which has been beater sized and then surface sized with a starch in the usual manner. Such a paper treated by the sodium alginate size, is substantially free from voids and deep spots, permits an even penetration of the sensitizing chemicals, improves dye penetration and yields improved dye images having greater visual density.

The following is a specific example of a sensitizing solution which may be employed for sensitizing paper prepared by my process.

Example 5

Water	cc--	100
Glycerin	cc--	5
Citric acid	grams--	2
Thiourea	do----	2
Zinc acetate	do----	2
2,3-dihydroxy-naphthalene-6-sulfonic acid	do----	3
Para-diazo dimethyl aniline	do----	2

This sensitizer solution may be applied in any of the usual ways as, for example, by applying an excess to the sodium alginate-sized paper, and then removing the excess by a doctor blade. The paper is then subsequently dried with warmed air. Such sensitized paper when exposed and developed in an atmosphere containing ammonia or other alkaline vapor, produces a deep blue dye image.

It is to be understood that the above example of a diazo sensitizing solution is cited merely for purpose of illustration. In general, I have found that paper sized with sodium alginate can be sensitized with any type of diazo sensitizer solution with the improved results hereinabove mentioned.

In practice, the composition of the size may vary over a wide range depending on the amount desired on the finished paper. The total size content may range from about 1 to 10% by weight in solution. Since sodium alginate produces very viscous solutions, even in low concentration, it is used in fairly small amounts and I have found it unnecessary to employ amounts exceeding 2% in order to obtain a satisfactory surface size. In general, the preferred range of sodium alginate in the sizing bath is from about 0.5 to 1%. Where starch is employed together with the sodium alginate, the concentration of the starch may vary from about 3 to 9.5%.

In practicing the invention, it is preferable to employ paper which has already been given a beater size and calendered, or in addition already possessing the usual surface starch sizing. However, good results are also obtained even on papers of more open or porous structure and it is to be understood that my invention is not limited to the employment of any particular type of paper.

Instead of employing paper as the base or support, the sodium alginate size may also be applied to cloth or to films, such as prepared from cellulose nitrate, cellulose acetate, or regenerated cellulose, or even glass plates or sheet metal. However, the greatest advantages are obtained when it is applied to a paper support.

The sensitizing compounds can be applied from a solution containing any suitable light-sensitive diazo compound together with one or more coupling components. They may also have present one or more stabilizing compounds selected from the group including hydrochloric acid, boric acid, tartaric acid, thiourea and the like. In this case, the exposed paper is developed by simply exposing it to a moist alkaline atmosphere containing, for example, ammonia or other alkaline paper.

In another modification, the diazo sensitizer may be applied to the paper and such a paper then exposed under the appropriate design to light. In this case, development is effected with an alkaline solution of a suitable coupling agent as, for example, one consisting of phloroglucinol, resorcinol, sodium carbonate and water. With paper which has been sized with sodium alginate, improved results are obtained regardless of the diazotype sensitizer solution employed. In each case, evenness of penetration of the sensitizing agents is obtained, voids and deep spots are substantially eliminated and the substantivity and visual density of the dye image is markedly increased.

I claim:

1. A diazotype sensitized material comprising a paper support, sodium alginate as a sizing material, and in direct contact with the said sizing material a light sensitive diazo compound in a sensitizing layer on a sized side of the paper support.

2. A diazotype sensitized material comprising a paper support, a mixture of sodium alginate and starch as a sizing material, and in direct contact with the said sizing material a light sensitive diazo compound in a sensitizing layer on a sized side of the paper support.

3. A diazotype sensitized material comprising a paper surface coated with a starch coating and a size of sodium alginate on said starch coating

and in direct contact with the said sizing material by a sensitizing layer containing a light sensitive diazo compound.

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