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BLEACHING OF CELLULOSE FIBERS IN
PEROXIDE BATHS

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The present invention relates to improved bleaching of cellulose fibers in peroxide baths.

In order to bleach successfully and economically textile fibers in peroxide baths (the so-called oxygen-bleaching), the liberation of oxygen must, as is known, be regulated exactly during the bleaching process. For this purpose, small amounts of substances retarding this liberation of oxygen (for instance water-glass) are added to the bleaching baths.

Substances are known which, in contra distinction to such retarders, accelerate the liberation of oxygen in peroxide baths ("catalysts"). Kind ("Das Bleichen der Pflanzenfasern" 1922, page 182) has already pointed out that the presence of small traces of metals in the peroxide bath causes undesired decomposition and oxygen is thereby lost to the real bleaching process. From the literature, especially metals, such as iron, copper, nickel and manganese have become known as such catalysts. All investigations have shown that the presence of even small amounts of metals or salts thereof in peroxide baths considerably damages textile fibers. Any contact with metals having such a catalytic action upon the peroxide bath is, therefore, avoided as much as possible in the apparatus for oxygen-bleaching.

Now, I have found that the process of oxygen-bleaching may be improved by incorporating with the material to be bleached, prior to the action of the peroxide bath, watersoluble cobalt salts, the amount being so small that the fiber is not essentially damaged in the bleaching process. In this manner cellulose fibers, such as cotton, linen, jute or viscose artificial silk and the like may be successfully bleached by means of peroxide, without fear of damage.

Thus the catalytic action of metal salts upon peroxide baths is purposely applied in this invention, but the mode of application is now, being such that the metal salts do not prematurely decompose the bleaching bath but control the course of the peroxide bleaching process.

The process is surprisingly simple. The material to be bleached is treated, for a short time, with a very dilute aqueous solution of a cobalt salt, at ordinary temperature, thereupon rinsed. In this manner the textile fiber becomes loaded with an amount of metal salt sufficient for the subsequent peroxide bleaching.

Owing to this pre-treatment the material may be oxygen-bleached, without damage, in a considerably shorter time, at a temperature which is essentially lower than that hitherto usually ap-

plied and also with the use of smaller amounts of caustic alkali or even without the use of caustic alkali in the bleaching bath, i. e. at a pH-value of between 7 and preferably 8.5.

Owing to these mild conditions of working it is possible to bleach by means of peroxide colored fabrics containing effect threads and dyed with dye-stuffs which, in the usual peroxide bleaching process, bleed or become disclosed, without the occurrence of such bleeding or discoloration.

The amount of cobalt salts, depending on the kind of fiber to be bleached and the degree of dirtiness, which must be used in the pretrating bath, in order to make sure that the necessary amount of metal salt is applied to the fiber, may easily be ascertained by means of a preliminary test. It is important that the amount be calculated so that there occurs neither a considerable damage of the fiber nor an undesired decomposition of the bleaching bath by the catalytic action of the metal. Experience has shown that these conditions are met in most cases by using pre-treating baths containing per liter from about 0.001 to about 0.01 gram of cobalt in the form of a salt; the invention is, however, not limited to these amounts.

It has already been proposed to add metal salt solutions to the hypochlorite solution in order to accelerate the bleaching process. These proposals are, however, without any importance since such process cannot be carried out without damaging the material, owing to the difficulty of limiting the amount of catalyst and regulating the liberation of oxygen from the hypochlorite solution. In the present invention the metal salt is not contained in the bleaching bath but is carried on the material to be bleached.

When the combined hypochlorite-oxygen-bleaching process frequently applied on an industrial scale is used, the treatment of the material with a cobalt salt is preferably inserted after the bleaching with chlorine, since part of the metal is removed from the fiber by the acidification usual in the hypochlorite bleaching process and the effect is, consequently, not guaranteed.

The following examples serve to illustrate the invention but they are not intended to limit it thereto:

1. Crude cotton yarn which has previously been boiled or washed is treated, for 10 minutes at a temperature of 30° C., with a solution containing per liter 0.005 gram of cobalt acetate, the proportion of the goods to the liquor being 1:20. The yarn is then rinsed cold and centrifuged. It is then bleached at 30° C. to 40° C. with 3 per cent

of hydrogen peroxide of 30 per cent strength with addition of 1 per cent of water glass, rinsed, soured, rinsed again and dried at a temperature which is not too high. Instead of cotton yarn, cotton fabric may also be treated in the same manner.

2. Crude cotton yarn which has previously been boiled or washed is pre-bleached at room temperature with a solution containing per liter 1 to 2 grams of active chlorine, then rinsed, soured, rinsed again and, thereupon, pre-treated with cobalt acetate, as described in Example 1. The yarn thus treated is then bleached until purely white, at 30° C. to 40° C., by means of 1.5 per cent of sodium peroxide with addition of 1 per cent of concentrated sulfuric acid and 1 per cent of water glass. It is then rinsed, soured, rinsed again, soaped, if desired, rinsed and dried at a temperature which is not too high. Cotton fabric, too, may be treated in the same manner.

3. Washed, fancy woven cotton piece goods (colored parts dyed with the azo-dyestuff obtainable from 1-(2'.3'-hydroxynaphthoylamino)-naphthalene and diazotized 1-amino-2-methoxy-4-nitrobenzene) are pre-bleached at room temperature with a solution containing per liter 1 to 2 grams of active chlorine, rinsed, soured, rinsed again and then pre-treated with cobalt acetate as described in Example 1. The piece goods pre-treated in this manner are then bleached, at 30° C. to 40° C., by means of 2 per cent of hydrogen peroxide of 30 per cent strength with addition of 1 per cent of water glass. They are then rinsed, soured, rinsed again, soaped, if desired, rinsed and dried at a temperature, which is not too high.

Instead of cobalt acetate, there may be used, with similar success, cobaltous salts in which cobalt is bound to other anions, such as, for instance, formate, nitrate, sulfate, chloride or the like.

I claim:

1. In the bleaching of cellulose fibers in alkaline peroxide baths the step which comprises pre-treating the material to be bleached, prior to the action of the peroxide bath, in a bath containing per liter 0.001 to 0.01 gram of cobalt in the form of a watersoluble salt.

2. Process for bleaching crude cotton yarn and cotton fabric which comprises boiling and washing the material, then treating it for 10 minutes at 30° C. with a solution containing per liter 0.005 gram of cobalt acetate, the proportion of the goods to the liquor being 1:20, then rinsing the material cold, centrifuging and bleaching it at 30° C. to 40° C. with 3 per cent of hydrogen peroxide of 30 per cent strength with addition of 1 per cent of water-glass, rinsing, souring, rinsing again and drying the material at a moderate temperature.

3. Process for bleaching crude cotton yarn and cotton fabric which comprises boiling and washing the material, then pre-bleaching it at room temperature with a solution containing per liter 1 to 2 grams of active chlorine, rinsing, souring, rinsing again and thereupon treating it with a solution containing per liter 0.005 gram of cobalt acetate, the proportion of the goods to the liquor being 1:20, then rinsing the material cold centrifuging and bleaching the material until purely white, at 30° C. to 40° C., by means of 1.5 per cent of sodium peroxide with addition of 1 per cent of concentrated sulfuric acid and 1 per cent of water-glass, then rinsing, souring, rinsing again, soaping, rinsing and drying the material at a moderate temperature.

4. Process for bleaching fancy woven cotton piece goods the colored parts of which have been dyed with the azo-dyestuff obtainable from 1-(2'.3'-hydroxynaphthoylamino)-naphthalene and diazotized 1-amino-2-methoxy-4-nitrobenzene, which comprises pre-bleaching the material at room temperature with a solution containing per liter 1 to 2 grams of active chlorine, rinsing, souring, rinsing again and then treating with a solution containing per liter 0.005 gram of cobalt acetate, the proportion of the goods to the liquor being 1:20, then rinsing the material cold, centrifuging and bleaching it at 30° C. to 40° C. by means of 2 per cent of hydrogen peroxide of 30 per cent strength with addition of 1 per cent of water-glass, then rinsing, souring, rinsing again, soaping, rinsing and drying at a moderate temperature.

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