CELLULOSE FABRICS BEING IMPREGNATED TO IMPROVE THEIR BLEACHING AND STRUCTURAL PROPERTIES

This invention is concerned with a novel method for bleaching textile fabrics with peracetic acid. More particularly, this invention relates to a method for bleaching cellulosic fabrics with peracetic acid at elevated temperatures.

Today, almost all large-scale bleaching of textiles, particularly cotton, is done with hydrogen peroxide. Although hydrogen peroxide bleaching is generally superior to the previously employed chlorine bleaching processes, it nevertheless suffers from several disadvantages. In the conventional process, the fabric is treated with an aqueous hydrogen peroxide solution and then processed under conditions that fully utilize the strength of the hydrogen peroxide as a bleaching agent. The wet fabric is stored at elevated temperatures, generally about 100°F, and contacted with steam for a short period of time, typically 10 to 20 minutes. For a continuous process, the wet fabric is subjected to repeated cycles of bleaching and washing, with the duration of each cycle controlled by the strength of the hydrogen peroxide solution and the temperature of the processing medium.

It has been suggested that if peracetic acid was substituted for hydrogen peroxide, sodium silicate would be unnecessary and thus the associated problems would be eliminated. However, reported attempts to effect bleaching with peracetic acid have indicated that long times, about an hour, are necessary for optimum bleaching, and the results are poorer than those obtained with hydrogen peroxide. See, for example, Rösch, “Deutsche Textiltechnik,” 10, 191-5 (1960).

It is an object of this invention to provide a process for bleaching textile materials, especially cotton, with peracetic acid.

This and other objects of this invention are accomplished by impregnating the fabric to be bleached with an aqueous medium containing peracetic acid substantially free of hydrogen peroxide and mineral acids, thereafter contacting the impregnated fabric with saturated steam at atmospheric pressure for a period of time not exceeding 30 minutes and thereafter cooling the fabric to a temperature of about 100°F and washing the fabric. By operating in this manner, we are able to obtain a degree of bleaching equivalent to that obtained with hydrogen peroxide for long periods of time without serious fabric deterioration.
3. from a magnesium oxide block. Whiteness was calculated by the equation:

Whiteness = (4 × blue reflectance) − (3 × green reflectance)

Yellowness was calculated by the equation:

Yellowness = (amber reflectance − blue reflectance) / (green reflectance)


Example 1

A piece of 80-inch by 80-inch scoured cotton printcloth was padded to about 100 percent wet pick-up with an aqueous solution having a pH of 5.5 and containing 2.37 weight percent peracetic acid, 0.5 weight percent sodium laurel sulfate as a wetting agent, 0.2 weight percent sodium hexametaphosphate as a stabilizer and 1.25 weight percent sodium hydroxide. The impregnated fabric was then exposed to steam at 100° C. for 5 minutes, washed and dried. The fabric had a blue reflectance of 87.8, a green reflectance of 90.6, a whiteness of 79.2 and a yellowness index of 0.04.

Employing identical procedures, except that the time was varied, several additional samples were impregnated with the peracetic acid solution and then bleached. The results from these tests are summarized in Table I, together with those from the above-described experiment as Run 1.

<table>
<thead>
<tr>
<th>TABLE I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run No.</td>
</tr>
<tr>
<td>Time, min.</td>
</tr>
<tr>
<td>Blue reflectance</td>
</tr>
<tr>
<td>Green reflectance</td>
</tr>
<tr>
<td>Whiteness</td>
</tr>
<tr>
<td>Yellowness Index</td>
</tr>
<tr>
<td>Fluidity, Fluid.</td>
</tr>
</tbody>
</table>

As is readily seen, the process of this invention provides a high degree of bleaching in from 5 to 10 minutes (Runs 1 and 2) with some additional improvement being obtained at a time of about 20 minutes (Run 3). Little further bleaching occurs on heating for longer times, such as one hour (Run 4), and the main effect of this additional heating is to promote oxidative degradation of the cotton, as is indicated by the approximate doubling in fluidity in going from 20 minutes to 60 minutes.

What is claimed is:

1. In the method for bleaching a cellulosic fabric which comprises impregnating the fabric with an aqueous medium containing peracetic acid and thereafter heating said impregnated fabric at elevated temperatures, the improvement of (1) employing an aqueous medium essentially free of mineral acids and hydrogen peroxide, and (2) contacting the impregnated fabric with saturated steam at about atmospheric pressure for a period not in excess of 30 minutes and thereafter washing said fabric.

2. In the method for bleaching a cellulosic fabric which comprises impregnating the fabric with an aqueous medium containing peracetic acid and thereafter heating said impregnated fabric at elevated temperatures, the improvement of (1) employing an aqueous medium essentially free of mineral acids and hydrogen peroxide, and (2) contacting the impregnated fabric with saturated steam at about atmospheric pressure for a period of from about 5 to about 10 minutes and thereafter washing said fabric.

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