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[54] **DESIZE-SCOURING OF TEXTILES WITH ALKALINE PEROXYDIPHOSPHATE SOLUTIONS**
2 Claims, No Drawings

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[51] **Int. Cl.** **D06l 1/14**
[50] **Field of Search** 8/138, 139, 111, 101

[56] **References Cited**

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ABSTRACT: Sized textiles are desize-scoured with aqueous alkaline solutions of peroxydiphosphates.

DESIZE-SCOURING OF TEXTILES WITH ALKALINE PEROXYDIPHOSPHATE SOLUTIONS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the textile art, and more particularly to the process of desize-scouring of textiles to both scour textiles and remove unwanted sizing materials.

2. Review of the Prior Art

In the treatment of textile greige goods containing cotton, they are conventionally scoured with hot aqueous alkali to reduce noncotton content, mainly fats, oil and waxes, plus the sizings used to facilitate the textile-making operation. The removal of these materials improves the speed and uniformity of fabric absorbency. Often, where especially good removal of noncottons is wanted, the scouring operation is preceded by an enzyme or bromite treatment to render the sizing readily soluble in the scouring operation. Synthetic fabrics are also desize-scoured to remove lubricants and sizing.

Some textile mills have adopted the suggestions outlined in FMC Corporation Inorganic Chemicals Division Technical Data Bulletin No. 124 entitled "Desizing with FMC Sodium Persulfate," released in April of 1966, and have used alkaline solutions of peroxydisulfates (often called persulfates) for desize-scouring. The process involves saturating greige goods with an aqueous solution containing from about 0.3 to 5.0 percent of peroxydisulfate salt, and 0.5 to 5.0 percent of caustic soda, percentages being based on weight of material (OWM), preferably with a small amount of wetting agent; after saturation, the material may be held 4 to 8 hours at below 110° F., or it may be heated at near the boil for 1 hour at ambient pressure, or for a few minutes at pressures which permit temperatures of the order of 270° to 280° F.

While excellent desize-scouring is obtained, the process has certain disadvantages. Decomposition of the peroxydisulfate during fabric treatment releases acid, so that higher alkali concentrations are needed to maintain desired conditions; this has a tendency to hydrolyze the cellulose in the fabric and weaken it a bit more than is optimum. Moreover, peroxydisulfates are catalytically decomposed at temperatures above 110° F., when metals, sizing agents, and many sequestering agents and wetting agents are present in the bath, so that textile-impregnating temperatures must be kept below optimum for most efficient operation.

STATEMENT OF THE INVENTION

We have discovered that excellent desize-scouring of greige goods can be obtained with aqueous alkaline solutions of peroxydiphosphates, using about 0.25 to 1.0 percent of peroxydiphosphate on the weight of material (OWM) and about 0.5 to 6.0 percent of caustic soda.

Despite the fact that the peroxydiphosphate is much more stable during saturation than peroxydisulfate, it is actually more efficient at treatment temperatures, producing substantially more effective removal of sizing agent, markedly less cellulose degradation, and a noticeable bleaching effect.

DETAILED DESCRIPTION OF THE INVENTION

In practicing the instant invention, we use aqueous alkaline solutions of water-soluble peroxydiphosphates. Since the sodium salt is difficult to produce in pure form, the preferred source of peroxydiphosphate is the potassium salt, tetrapotassium peroxydiphosphate—$K_4P_2O_8$. The amount used depends on the amount of sizing agent and lubricant in the greige goods being treated. About 0.25 to 1.0 percent OWM is generally used, with 0.5 percent a typically desirable concentration.

Any caustic alkali may be used with the peroxydiphosphate. Cost reasons make caustic soda the chemical of choice; it is used in concentrations of about 0.5 to 6.0 percent.

Typically, a wetting agent is used to facilitate the pickup by the fabric of the treating solution. Any type of wetting agent may be used, including anionic, cationic and nonionic agents. In addition, most mills add chelating agents, to prevent deposit in the cloth of metallic impurities in their water.

The temperature of saturation of the cloth has a marked effect on speed of pickup; for efficient saturation by padding, most operators like to run at 140° to 150° F. This cannot be done with peroxydisulfates; unless special stabilizers are added, the peroxydisulfate decomposes rapidly at temperatures above 110° F. The peroxydiphosphate solutions can be padded at 140° F. without stability problems, and up to 180° F. when stabilizers are added.

Despite this stability at saturation temperatures, peroxydiphosphates are substantially superior to peroxydisulfates in removal of sizing agents.

The effectiveness of removal is generally tested by AATCC test method 79–1968, which measures the time required for the fabric to absorb a drop of water, and by ASTM test method 97–1968, which determines noncotton content as (1) fats, oil and waxes and (2) water and enzyme extractables. Typical comparisons of peroxydisulfate with caustic soda alone show a halving of the absorption time; another halving of the absorption time is obtained by replacing the peroxydisulfate with peroxydiphosphate.

In the area of cellulose degradation, moreover, tests of fluidity of the fabric, by AATCC test method 82–1968, show that, whereas peroxydisulfates produce a markedly greater degradation than caustic soda alone, peroxydiphosphate treatments actually reduce the degradation somewhat as compared to caustic soda alone.

In the process, the material is caused to absorb the desize-scouring solution, generally by a padding operation at elevated temperature, about 140° to 150° F. However, the temperatures are a matter of choice and convenience, as is the pickup, which most plants run at 100 to 150 percent, depending on the material being treated.

The actual desize-scouring is carried out at temperatures at or near boiling, in any convenient equipment. The typical J-box treatment at ambient pressures with steaming may be used; about an hour is a desirable heating time at 200° to 212° F. Many mills prefer the 1 to 2 minute treatment times possible in pressure equipment such as the Vapor-loc, which permits temperatures of the order of 275° F. to be employed, at pressures of the order of 50 p.s.i.g. Where blends of cotton and synthetics are being treated, or synthetics alone, lower temperatures are desirable; temperatures as low as 150° F. are commercial. The desize-scouring can actually be carried out at room temperature, but more time is required.

The material is rinsed after the treatment to remove chemicals, and is then further processed as desired.

SPECIFIC EXAMPLES OF THE INVENTION

The following specific examples of the invention are given by way of illustration and not by way of limitation. In the examples, noncotton content was determined by AATCC test method 97–1968; reflectance values were obtained on a Hunterlab reflectometer for whiteness, Model D–40, using a blue filter; absorbency was determined by AATCC test method 79–1968; and fluidity was determined by AATCC test method 82–1968.

EXAMPLE 1

PRIOR ART FOR COMPARISON

A sample of 100 percent cotton Oxford fabric was desize-scoured in a Vapor-loc for 90 seconds, 45 p.s.i., 275° F., with 2.0 percent sodium hydroxide and 0.1 percent wetting agent. Percentages are on weight of material. Fabric was saturated to 100 percent wet pickup and steamed. Total water and enzyme extractable content was found to be 0.66 percent. There were in addition 0.26 percent fats, oils and waxes remaining, making a total of 0.92 percent noncottons. Fluidity was 4.0 $poise^{-1}$, drop absorbency was 10.4 seconds.

PRIOR ART FOR COMPARISON

The same 100 percent cotton Oxford fabric was desize-scoured in a Vapor-loc for 90 seconds, 45 p.s.i., 275° F., with

2.0 percent sodium hydroxide, 0.1 percent wetting agent and 0.5 percent sodium peroxydisulfate. A fluidity was obtained on the treated fabric of 5.0 poise^{-1}. Drop absorbency was 5.0 seconds; water and enzyme extractables were 0.49 percent, fats, oils and waxes 0.2 percent, making total noncottons 0.69 percent.

THIS INVENTION

The same treatment as above, but with the addition of 0.5 percent tetrapotassium peroxydiphosphate, lowered the water and enzyme extractable content to 0.43 percent and the fats, oils and waxes to 0.14 percent, making total noncottons 0.57 percent. Fluidity was 3.7 poise^{-1}; drop absorbency was down to 2.3 seconds.

EXAMPLE 2

Samples of 100 percent cotton Oxford were desize-scoured for 20 minutes at 212° F. with 2.0 percent sodium hydroxide, 0.1 percent wetting agent, and 0.0, 0.25 and 0.50 percent tetrapotassium peroxydiphosphate respectively. The final whiteness of the fabric obtained from the three treatments was 63.7, 65.1 and 66.6 percent.

EXAMPLE 3

PRIOR ART FOR COMPARISON

A mill trial was held for desize-scouring of terry toweling. The solution contained 3.9 percent sodium hydroxide, 0.54

percent of a proprietary chelating agent, 0.24 percent of a wetting agent and 0.38 percent trisodium phosphate. The toweling, saturated for 130 percent wet pickup and steamed for 1 hour in a J-box, at 212° F., yielded a cloth with total noncotton content of 0.88 percent (this is an average of determinations on four samples of fabric).

THIS INVENTION

The same treatment as above, but with the addition of 0.38 percent tetrapotassium peroxydiphosphate, based on solution weight, gave a total noncotton content of 0.56 percent (this is an average of determinations on two samples of fabric).

Obviously, the examples can be multiplied indefinitely without departing from the scope of the invention as defined in the claims.

We claim:

1. The method of desize-scouring of greige goods which comprises saturating the goods with an aqueous solution of a caustic alkali and a soluble peroxydiphosphate, the goods picking up from 0.25 to 1.0 percent of their weight of peroxydiphosphate and from 0.5 to 6.0 percent of their weight of caustic alkali, holding the goods to cause the peroxydiphosphate to act on the fats, oils, waxes and sizing material on tHe greige goods, and washing the goods with water to remove chemicals and dissolved matter.

2. The method of claim 1, in which the treatment is near the boiling point.

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