Textile Studies II
Laboratory Report

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Date of Experiment:
January 28, 2013
Experiment 1: Desizing of Cotton Grey Fabric

(1) **Introduction**

Sizing is a common method to strengthen the warp yarn. The sizing agents are mainly water insoluble starch, PVA. However, starch may affect the further treatment of fiber. Desizing is applied to remove size materials for further treatment such as coloring and printing. The importance of desizing is to prevent uneven dyeing, to enhance wettability and water absorption, and to increase better efficiency of subsequent scouring and bleaching. There are three basic ways to decompose starch to water soluble products, for example, enzyme desizing, acid desizing and oxidative desizing. The most effective method is enzyme desizing since only starch is decomposed by the action of enzyme and no fiber damage is resulted. Furthermore, the activity of enzyme is affected by several factors such as pH value, temperature and concentration.

(2) **Material**

- 2 pieces of 2 gram grey cotton fabric
- pH paper
- Iodine solution
- Stock Solution

(3) **Liquor Ratio**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Required Concentration</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapidase L-40</td>
<td>5g/L</td>
<td>10mL</td>
</tr>
<tr>
<td>Calcium Chloride</td>
<td>2g/L</td>
<td>10mL</td>
</tr>
<tr>
<td>Sandozin NI</td>
<td>0.2g/L</td>
<td>10mL</td>
</tr>
<tr>
<td>Water</td>
<td>-</td>
<td>70mL</td>
</tr>
</tbody>
</table>

50:1 (i.e. Treating 1g of cotton fabric with 50mL desizing solution)
(4) **Apparatus**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipette</td>
<td>3</td>
</tr>
<tr>
<td>Pipette filler</td>
<td>1</td>
</tr>
<tr>
<td>Glass rod</td>
<td>1</td>
</tr>
<tr>
<td>Metal container</td>
<td>1</td>
</tr>
<tr>
<td>Thermometer</td>
<td>1</td>
</tr>
<tr>
<td>Water bath</td>
<td>1</td>
</tr>
<tr>
<td>Electronic iron</td>
<td>1</td>
</tr>
<tr>
<td>Measuring cylinder</td>
<td>1</td>
</tr>
</tbody>
</table>

(5) **Experimental Procedures**

1. A metal container was cleaned to remove dyes and impurities.

2. 10mL of Rapidase L-40, Calcium Chloride and Sandozin NI was transferred into the metal container respectively through pipette.

3. 70mL tap water was measured by measuring cylinder and then transferred to the container.

4. By using a glass rod, the solution was mixed evenly.

5. A few drops of desizing solution were added to a pH paper. It was then compared with the reference pH value to confirm the value is around 6.5.

6. A piece of grey cotton fabric was added to the container.

7. The container was covered with a lid and then put into the water bath.

8. By using thermometer, the temperature was kept around 70°C during the whole experiment.

9. After 60 minutes, the fabric was removed and then rinsed with cold water.

10. The cloth was squeezed and dried by an electric iron.

11. Lastly, few drops of iodine solution was added onto the treated cloth to observe the desizing effect.
(6) Results

Sample attachments

Untreated fabric

Desized fabric

Untreated fabric with iodine test

Desized fabric with iodine test
(7) Discussion

Preparation of desizing solution:

1. As the metal container may contain some impurities such as dyes, it should be cleaned thoroughly before using. Otherwise, the fabric may be colored, and consequently, the result may be affected.
2. The desizing solution consists of Rapidase L-40 which is one kind of enzyme. Enzyme is sensitive to temperature. If the temperature is too high, it might be denatured and lose its function. If the temperature is too low, it might be inactive and the rate of reaction will be very slow. Hence, the experiment should be done under the optimum temperature (70°C) of that enzyme.
3. The activity of enzyme also affected by the chemical environment. The solution should be kept in acidic environment to ensure the proper function of enzyme.
4. Sandozin NI is a wetting agent to improve the water penetrating power of the cotton fabric.
5. Calcium Chloride is an activator, which used to promote the activity of enzyme and activate the experiment.

After treatment:

1. The cloth with desizing treatment turned brighter and lighter in color. It changed from yellow to light brown.
2. The treated fabric became softer in handle compared with the original one since most of the sizing materials were broken down into the small soluble molecules and removed.
3. The treated fabric has better wettability when compared with the grey cotton fabric.

Iodine Test:

The color produced on the fabric indicates the degree of desizing.

1. The original grey cotton fabric has a dark blue spot on the surface. It means that such fabric is sized and starch is present.
2. The treated cloth has a light brown spot. It means that most of starch is decomposed to water soluble dextrine, and hence, removed. The fabric is desized.
(8) Conclusion

The iodine test aims at determining the presence of starch on fabric. Light brown spot were observed on the treated cloth, which implies most of the starch was decomposed to water soluble molecules and removed. Moreover, the treated fabric turns brighter and lighter in color and has a soft handle. To conclude, desizing of grey cotton fabric is successful. Further treatments such as scouring and bleaching can be done after.
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Laboratory Report

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Date of Experiment:
February 18, 2013
Experiment 2: Scouring of Cotton Fabric

(1) Introduction

Scouring of cotton fabric is a chemical washing process with the aim of removing impurities that may appear in raw cotton such as oils, fats, waxes and other impurities. The process basically consists of boiling the cotton fabric with strong alkali and detergent at high temperature. Scouring is an essential prerequisite before other finishing processes such as bleaching, dyeing, printing of the fabric. The aim of this lab is to scour the already desized cotton fabric to determine any differences in appearance between the scoured fabric and the desized fabric. Furthermore, a water absorbency test will be conducted in order to determine the success of the scouring. The sinking-time of the cotton will have decreased if scouring has been successful.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Required Concentration</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandopan DTC</td>
<td>2g/L</td>
<td>2 mL</td>
</tr>
<tr>
<td>Caustic Soda</td>
<td>20g/L</td>
<td>20 mL</td>
</tr>
<tr>
<td>Sodium Silicate</td>
<td>2g/L</td>
<td>2 mL</td>
</tr>
<tr>
<td>Sodium Sulphite</td>
<td>2g/L</td>
<td>2 mL</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>74 mL</td>
</tr>
</tbody>
</table>

(2) Material

- 2 pieces of 2 gram desized cotton fabric
- Caustic soda
- Sodium silicate
- Sodium sulphite
- Detergent (Sandopan DTC)
(3) **Liquor Ratio**

50:1 (i.e. Treating 1g of cotton fabric with 50mL desizing solution)

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipette</td>
<td>3</td>
</tr>
<tr>
<td>Pipette filler</td>
<td>1</td>
</tr>
<tr>
<td>Glass rod</td>
<td>1</td>
</tr>
<tr>
<td>Metal container</td>
<td>1</td>
</tr>
<tr>
<td>Thermometer</td>
<td>1</td>
</tr>
<tr>
<td>Water bath</td>
<td>1</td>
</tr>
<tr>
<td>Electronic iron</td>
<td>1</td>
</tr>
<tr>
<td>Measuring cylinder</td>
<td>1</td>
</tr>
</tbody>
</table>

(4) **Apparatus:** N/A

(5) **Experimental Procedures**

1. A metal container was cleaned to remove dyes and impurities.
2. A bath was prepared according to the above table. The solution was transferred into the metal container by pipettes.
3. 74 mL tap water was measured with a measuring cylinder then transferred to the container.
4. A glass rod was used in order to mix the solution.
5. A piece of desized cotton fabric was added to the container.
6. The container was covered with a lid then put into the water bath to boil for 60 minutes in 90°C. This is the process of scouring.
7. After scouring the cloth was rinsed thoroughly under a tap then put into a container containing acidic acid for one minute in order to neutralise the fabric.
8. The fabric was then rinsed with running water again until it is free from acid.
9. An electric iron was used to dry the fabric.
10. The second part of the laboratory is to perform a water absorbency test. A circular sample in the size of a $1 coin was cut from the scoured fabric.
11. The cut out sample was placed on the surface of a beaker of distilled water and a stop watch was used to determine the time it took for the sample to sink.
(6) **Results**

Sample attachments

| Original desized fabric | Scoured fabric |
Absorbency test

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sinking time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desized fabric</td>
<td>300 seconds</td>
</tr>
<tr>
<td>Scoured fabric</td>
<td>10 seconds</td>
</tr>
</tbody>
</table>
(7) **Discussion**

*Preparation of solution:*

1. The metal container holding the solution might not have been sufficiently and thoroughly cleaned before the start of the experiment thus carrying impurities or other unwanted chemicals, consequently, the final result may be affected.

2. A combination of alkali and detergent treatment is the most widely used for scouring cotton fabric. Caustic Soda (sodium hydroxide) and Sandopan DTC, one kind of alkali and detergent respectively, are often used together in cleaning cotton products since they are effective in removing stains from grease, oil, waxes etc.

3. Sodium Silicate (Builder) was used to prevent redeposition of dirt.

4. Sodium Sulphite is the reducing agent which is often used in purification processes as it can efficiently remove traces or excess amounts of impurities.

*After treatment:*

1. The fabric with the scouring treatment turned much brighter and lighter. It changed from light brown to pale yellow.

2. The cloth consisted fewer black spots since most impurities such as fats, grease, dirt were removed during scouring.

3. The treated fabric became softer in handle compared with the original desized fabric.

4. The water absorbency greatly improved when compared with the original one.

*Absorbency test:*

1. The presence of fats makes poor water absorbency. Thus the fabric before scouring takes 300 seconds to sink as it cannot absorb water as efficiently. The cotton fabric after scouring takes 10 seconds to reach the bottom of the beaker of distilled water. This indicates that scouring has been successful as the experiment managed to remove the impurities from the cotton fabric, consequently improving water absorbency.
Conclusion

The aim of the experiment was to remove any impurities in our original desized cotton fabric by scouring. The treated fabric turns brighter and lighter in color. Fewer impurities are remained in the scoured fabric. It is then ready for bleaching. In conclusion, scouring of the desized cotton fabric was successful.
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Date of Experiment:
February 18, 2013
**Experiment 3: Bleaching of Cotton Fabric**

1. **Introduction**

   Although much of the coloring matter of raw cotton fibers are removed in the scouring stage together with the impurities, there will still be some natural coloring matter left in the cotton fabric that could not be removed, consequently the fabric will still have traces of color in them. Therefore bleaching is necessary. The aim of bleaching is to whiten the cotton fabric. The process consists of oxidizing the bodies into simpler water-soluble colorless compounds by using oxidizing agents, for example hydrogen peroxide.

   The aim of this lab is to bleach the already scoured cotton fabric to determine any differences in appearance between the unbleached and the bleached fabric.

2. **Material**

   Well scoured cotton fabric (2 x 2 grams each)

   **Stock solution:**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Peroxide</td>
<td>130 volume</td>
</tr>
<tr>
<td>Sodium Silicate</td>
<td>10%</td>
</tr>
<tr>
<td>Caustic Soda</td>
<td>10%</td>
</tr>
<tr>
<td>Sandopan DTC</td>
<td>1%</td>
</tr>
</tbody>
</table>

3. **Liquor Ratio**

   50:1 (i.e treating 1g of cotton fabric with 50ml bleaching solution)

<table>
<thead>
<tr>
<th>Chemical/Bath condition</th>
<th>Stock concentration</th>
<th>Required concentration</th>
<th>Volume to be taken from stock solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Silicate</td>
<td>4g/l</td>
<td></td>
<td>4 ml</td>
</tr>
<tr>
<td>Sandopan DTC</td>
<td>0.5g/l</td>
<td></td>
<td>5 ml</td>
</tr>
<tr>
<td>Hydrogen Peroxide</td>
<td>10 ml/l</td>
<td></td>
<td>1 ml</td>
</tr>
<tr>
<td>pH (adjusted by 10%</td>
<td>10.5-11.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>caustic soda solution)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. **Apparatus**

<table>
<thead>
<tr>
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<td>Thermometer</td>
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<tr>
<td>Water bath</td>
<td>1</td>
</tr>
<tr>
<td>Electronic iron</td>
<td>1</td>
</tr>
<tr>
<td>Measuring cylinder</td>
<td>1</td>
</tr>
</tbody>
</table>

5. **Experimental Procedures**

   a. A metal container was cleaned to remove dyes and impurities

   b. Bleaching liquor was prepared with a 250 ml volumetric flask according to the above table.

   The solutions were transferred into the metal container by pipettes.

   c. 90 ml tap water was measured with a measuring cylinder then transferred to the container.

   d. A glass rod was used in order to mix the solution.

   e. A piece of wet fabric was added into the solution and in the waterbath at 50 degrees. The temperature was raised to 90 degrees over 20 to 30 minutes. The container was covered with a lid. The bleaching continues for one hour at this temperature.

   f. After bleaching the piece of fabric was removed from the metal container and rinsed thoroughly under running water.

   g. An electric iron was used to dry the fabric.

   h. A comparison was made between the bleached and unbleached fabric samples to determine any differences.
6. Results

Sample attachments

7. Discussion

a. The metal container holding the solution might not have been sufficiently and thoroughly cleaned before the start of the experiment thus carrying impurities or other unwanted chemicals that could have affected the final results of the experiment.

b. Sodium silicate is the stabilizer, it stabilizes and reduces the breakdown or loss of oxygen

c. Sandopan DTC is the wetting agent which will lower the surface tension of a liquid thus increasing the spreading and penetrating properties of a liquid.

d. The bleached fabric is whiter than the unbleached fabric.

e. The handle of the bleached fabric became less soft than the unbleached fabric.
8. **Conclusion**

The aim of this experiment was to bleach the already scoured cotton fabric. The treated fabric turned much whiter in color and less soft in handle. In conclusion, bleaching of the scoured cotton fabric was successful.
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Lam Ho Yi (12052688D)

Date of Experiment:
March 18, 2013
Experiment 8: Dyeing Cotton with Reactive Dye

Introduction

Reactive dye is a suitable method for receiving high fastness to wet treatment, dry cleaning, and rubbing. Due to its unique property of reacting with cellulose, dyeing material will become an intrinsic part of the cotton fiber. To have a better dyeing process, Hot Type (at 95°C) is commonly used. However, in this experiment, Cold Type (at 30°C / room temperature) was used. Another dyeing method is Warm type (at 60°C), different temperatures cause different effects on the fiber. The recipes of this method were added separately in different times. Salt can promote dye exhaustion. To enhance evenness of the fiber, salt was added two times separately. Water was added as a medium to absorb soda ash.

Materials used

- 2 x 2 grams scoured cotton yarns
- Water: 46ml
- Stock Solution: Total volume: 54ml

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Concentration</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyes (Drimarene Blue KBL)</td>
<td>1%</td>
<td>4ml</td>
</tr>
<tr>
<td>Common salt (Sodium Chloride)</td>
<td>10%</td>
<td>40ml</td>
</tr>
<tr>
<td>Soda ash</td>
<td>10%</td>
<td>10ml</td>
</tr>
</tbody>
</table>

Liquor Ratio: 50 : 1 (100ml)
**Dyeing method:** Cold Type at 30°C / room temperature

**Experiment Procedure**

1. One set of yarn, water and dye were added into dyeing bath. A stick was used to stir until materials were well mixed.

2. After 10 minutes, 20 ml of salt was added into the bath. Stirred again.

3. 10 minutes later, another 20 ml of salt was added into the bath. Stirred again.

4. After 10 minutes, 10 ml of soda ash was added into the bath. Stirred again.

5. After 45 minutes, dye uptake of the cotton yarn was achieved and was rinsed by cold water. The cleaned fiber was then dried.

**Result (sample attachments)**

Non-dyed cotton yarn: Dyed cotton yarn:
Discussion

After the dyeing process, a cotton yarn was in completely dyed blue. Because of the failure of experiment 9 (Dyeing Wool with Acid Dye), the yarn was loosened in the knot stage. It could prevent the unevenness of dye. In order to get a better performance of dyeing, salt was added in two portions at 20 minutes interval after the commencement of dyeing. Another way to prevent unevenness is to make sure the yarn and all chemicals were mixed. After rinsing the dyed fiber, the color of the fiber was much lighter than the non-rinsed fiber. Make sure to use the scoured cotton yarn in this experiment because scoured yarn can provide better water absorbency compared with desized yarn.

Conclusion

The aim of this experiment is to dye the cotton fiber. Nowadays, using reactive dye is the most common dye in the dyeing of cotton. Common salt and soda ash were used in this experiment because they can provide a better dyeing effect. Yarn which is dyed in this method provides very high fastness to wet treatments, dry cleaning and rubbing. Using the cold type to dye the yarn is more convenient but it also does not have as good of a dye effect. Time controlling is also important in this method.
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Date of Experiment:
March 18, 2013
Experiment 9: Dyeing Wool with Acid Dye

Introduction

Acid dye gives material a very bright and complete look. There are three classes of acid dye: Acid Leveling Dye, Acid Milling Dye and Super – milling Acid Dye. In this experiment, Acid Milling was used due to its moderate performance compared with the other two acid dyes. Dyeing PH of this method is 4-6, which is gentler compared with acid leveling dye (PH 2-4) and super–milling acid dye (PH 6-8). The fiber affinity and molecular weight is high. However, the solubility of this method is low. The ideal color under this experiment is red.

Materials used

- 2 x 2g scoured wool yarns
- Water: 84ml
- Stock Solution: Total volume: 16ml

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Concentration</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dye (Coomassie red P)</td>
<td>1%</td>
<td>4ml</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>1%</td>
<td>8ml</td>
</tr>
<tr>
<td>Glauber’s salt</td>
<td>10%</td>
<td>4ml</td>
</tr>
</tbody>
</table>

Liquor Ratio: 50 : 1 (100ml)
Experiment procedure

1. All the chemicals (dyestuff, acetic acid, glauber’s salt) were added into water at the beginning of the process at room temperature. A stick was used to stir the materials until they were mixed well. The bath was put onto the boiling bath.

2. After the temperature rose to 90℃, time started ticking.

3. After 45 minutes, dyed uptake from the wool was achieved. It was then rinsed by cold water. The yarn was then dried by hot air.

Result (sample attachments)

Non-dyed wool yarn:                  Dyed wool yarn:
Discussion

After acid milling dyeing, the wool yarn was red. Some parts of the yarn were not dyed completely or even dyed at all. Those non-dyed parts were covered by a knot. As a result, this experiment was not in a perfected performance. Also, we found that the color of the wool yarn from different groups was different. Some of the groups were darker in color and some of the other groups were lighter in color. It may be because the ratio of different groups was not uniform or it may be affected by other impurities of the dyeing bath because previously used colorant was still stayed on the bath.

We also found that after the absorbency of the dyestuff, the water in the bath was clear again. All the color was completely and successfully absorbed by the yarn.

Conclusion

The aim of the experiment is to dye the scoured wool yarn. A scoured yarn provides better absorbency of water. The reason for choosing acid milling dye is because of its moderate performance. If we wanted a better performance, it is better to have hydro-extraction. The total performance of experiment 9 was not as good as experiment 8 (Dyeing Cotton with Reactive Dye) because we forgot to loosen the knot of the wool yarn.
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Date of Experiment:
April 15, 2013
Experiment 12: Printing Cotton Fabric with Pigment

Introduction

Pigments are extremely valuable components in the coloration of textiles, especially in the process of printing in the modern day. People all over the world are willing to pay top dollar for a t-shirt that has been printed upon. Images resembling a specific brand or logo such as Louis Vuitton or Prada are highly coveted. With the materials being cheap and customers willing to pay your price, the profit margins are extremely high. If you want to get rich quick, this could be one way of doing so.

Pigments are insoluble in water and do not have substantivity for textiles. This means that the substance will not wash away when exposed to water. They are although not one hundred percent invincible when it comes to dry cleaning or rubbing. Creating a paste that will withstand exterior forces will add to the quality, therefore increasing the price.

Their application is also very different from other laboratories we have had the opportunity to experiment with in the past. In this laboratory, we were able to run through the process of printing on cotton fabric and our aim was to see how the “pros” do it in the industry.
Materials Used

Printing Paste

Pigment 40g
Acramin SLN 150g
Diammonium Hydrogen Phosphate (1:2) 30g
Acrafax CN 10g
Emulsion Thickening 770g

1000g

Emulsion Thickening

Emulsifier AC 20g
Water 230g
White Spirit 750g

1000g

Emulsifier AC is dissolved in water, then white spirit are added with high speed stirring, which is continued until the mixture is thoroughly emulsified.

1 Piece of 8 gram Cotton Fabric

Red Pigment (set out)

Yellow Pigment (set out)

Blue Pigment (used)

Black Pigment (set out)

Squeegee

Printing Screen

Liquor Ratio Used : N/A
**Experiment Procedure**

1) We placed a few tablespoonfuls of the prepared printing paste and pigment into a container.

2) Then stirred it thoroughly until we got a nice, even effect.

3) We placed the cotton sample on the table and taped the cotton fabric to the table with masking tape.

4) We placed our screen on top of the cotton fabric and dabbed a few spoonfuls of the printing paste on to the screen.

5) We put our squeegee on the inside lower lip of the screen and pulled and pushed the printing paste and squeegee together to and from us. We repeated this two to three times.

6) After that, we squeegeed away the remaining paste into the container and picked up the screen from the cotton fabric.

7) Then we removed the tape from the fabric and table.

8) Soon after, we dried the fabric at 100 degree Celsius and then baked it at 180 degree Celsius for one minute.
Results

![Image of a drawing with a cat figure]

Discussion

Once the screen was removed we came across a few errors on the sample. One was a spot on the right leg, another was a “hole” in the outline of the right arm, and the last were the lines of the object were not very clear.

We believe that the first error was due to not patching up the screen properly when creating the screen. Sometimes after exposing your screen you will find a spot from a speck of dirt. This must be patched up immediately or you will not receive the correct results.

The next error, “the hole,” in the arm outline was due to the screen being blocked. This could have been cause from improper washing after the previous use. If all the unwanted matter is not thoroughly removed prior, the pigment paste may not pass through the screen.

And finally the outline of the image was not all that clear. We believe this is due to once again the blockage of pigment paste on the outside of the line or improper screen making. This error could have been caused by passing the squeegee and paste too many times over the screen making the outline uneven. Another fault could have been made when drawing the design to begin with. The black marker used on the white paper may not have been the sharpest.
Conclusion

Throughout this experiment, we were able to learn from our mistakes. We learned that the printed image on the cotton fabric cannot be as clear as we wanted it to be if we do not use a sharper black marker, fill in patches on our screen, and wash our screen properly after each use. From now on, we know better than to make these mistakes again. We are now one step closer to becoming a “pro” in the industry!

Reference

N/A
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Date of Experiment:
April 29, 2013
**Experiment 14: Resin Finishing**

**Introduction**

Resin finishing is one of the most important and advancement in textile finishing. The finishing is usually used in cotton and the aim of it is to improve the crease recovery property and keep the fabric smooth. In the process, the cotton fabric would be given a wash and wear finish, so it can compete effectively with synthetic blends.

**Material Used**

- 100% cotton fabric x2
- A set of crease recovery angle measure equipment

**Recipe**

- Fixapret CL (Resin) 100g/L
- Siligen SIN (Softener) 30g/L
- Magnesium Chloride (Catalyst) 20g/L
Experiment Procedure

1. A 100% cotton fabric was padded at room temperature with a liquor pick-up of 70%.
2. The fabric was dried at 100°C in an oven.
3. The fabric was cured at 150°C in a dryer machine for 3 minutes.
4. The untreated fabric and treated fabric were cut to the size of 40mm x 15mm.
5. The untreated fabric was folded end to end and held by tweezers. The specimen was gripped no more than 5mm from the end.
6. The untreated fabric was placed on the marked area of the lower plate of the loading device, and it was applied the load gently for 5 minutes.
7. The load and tweezers were removed. The untreated fabric was transferred to the specimen holder of the measuring instrument.
8. The crease recovery angle was read for 5 minutes. (Adjustment of keeping the suspended free limb in vertical position was required during the recovery period)
9. Steps 5-8 were repeated for the treated fabric and finally the results of two fabrics were compared.

Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>Crease Recovery Angle</th>
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<tbody>
<tr>
<td>Untreated Fabric</td>
<td>54°</td>
</tr>
<tr>
<td>Treated Fabric</td>
<td>120°</td>
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</tbody>
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Discussion

Crease Recovery Angle reflects the recovery level of a fabric after it has been folded. The instrument would show the angle. If the angle is 0°, it means there is no recovery of a fabric, if the angle is 180°, it means the fabric can completely recover to flat. As a result, when the equipment shows a larger angle of the fabric, the larger recovery the level is.

In this experiment, the resin finishing aimed to improve the recovery level of the cotton fabric. After the treatment, the angle measurement showed the recovery angle of the treated fabric was 120°; and for the untreated fabric, the angle was 54°. As a result, we could see that the angle of the treated fabric was larger than the untreated one, and it meant that there was a lot of improvement in recovery after resin finishing.

The reason why the treatment can increase the recovery level of the fabric is because of the resin. Resin is a cross linking agent which is from a covalent bond. It would cause the reaction with –OH groups of cellulosic materials when the pH level of acidic medium is 3-4. The bonding would combine together with the fabric and make it become flatter, thus the fabric would not easily fold without pressure and the crease recovery level would be enhanced.

Conclusion

Resin finishing aims to improve the crease recovery level and keep the fabric smooth and flat. After the treatment, large improvements can be seen on the cotton fabric. Thus, the finishing is widely used in textile industry and has become an important treatment.

Reference

http://www.slideshare.net/abiramtex/introduction-of-finishing-and-resin-finishing