Faculty of Engineering
Department of Textile Engineering

Studies on the effect of Scouring-Bleaching on the physical characteristics of cotton fabric.

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Submitted by:

1. Mahfuzur Rahman.

ID: 201-23-885

2.Md. Arif .

ID: 201-23-969

Supervised by:

Mr. Tanvir Ahmed Chowdhury

Assistant Professor

Department of Textile Engineering

Faculty of Engineering

Daffodil International University

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Bachelor of Science in Textile Engineering

Advance in Wet Processing Engineering.

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DECLARATION

By endorsing this statement, we, representing Daffodil International University, affirm that Mr. Tanvir Ahmed Chowdhury, an assistant professor in the textile engineering department of the engineering faculty, offered guidance throughout the execution of this study. Additionally, we confirm that neither this project nor any of its components have been previously presented to another institution for the purpose of obtaining a degree or certification.

Mahfuzur Rahman

ID: 201-23-885

Department of Textile Engineering

Daffodil International University

Arif

Md. Arif

ID: 201-23-969

Department of Textile Engineering

Daffodil International University

LETTER OF APPROVAL

This project report was produced by Md. Arif (201-23-969) & Mahfuzur Rahman (ID: 201-23-885), approved as partial satisfaction of the prerequisites for the Bachelor of Science in Textile Engineering degree. The aforementioned students have completed their project work '**Studies on the effect of Scouring-Bleaching on the physical characteristics of cotton fabric**' under my supervision. During the course of the research, we found them to be earnest, hardworking, and enthusiastic.

Mr. Tanvir Ahamed Chowdhury

Assistant Professor

Department Of Textile Engineering

Faculty Of Engineering

Daffodil International University

ACKNOWLEDGEMENT

Above all, we express our gratitude to the Almighty Allah for His gracious blessings, which have empowered us to effectively complete this project.

In order to complete our project report, we would like to thank Ass. Prof. Mr. Tanvir Ahmed Chowdhury, an assistant professor (Head In Charge) in the department of textile engineering at the Daffodil International University faculty of engineering. The extensive knowledge and genuine passion of our supervisor in textile dyeing and finishing served as a driving force in completing the task. His unwavering patience, academic guidance, continual motivation, hands-on supervision, valuable feedback, and dedication to refining multiple drafts at every stage were instrumental in achieving our goal.

In closing, we extend our thanks to our parents, friends, and loved ones for their constant support, encouragement, and resilience throughout the creation of the project report. We also appreciate the contributions of our fellow classmates at Daffodil International University who engaged in discussions while completing their coursework.

DEDICATION

We dedicate this thesis (project) to our esteemed professors, Assistant Professors and parents.

ABSTRACT

This project holds significance in the domain of wet processing technology project report, we have gained comprehensive understanding of the operational processes involved in physical alterations before and after scouring and bleaching in textiles. We take six type of Knit & Woven fabric. Also we test 7 types of physical change. Here is the test name: Weight loss test, Elmendorf Tearing test, Universal Strength test, Bursting test, Reflection test by Spectrophotometer, GSM test, Drop Test.

The weight loss test, a commonly utilized assessment in the industry, evaluates scouring process efficiency. The Elmendorf tearing test is crucial, assessing fabric tear resistance. The universal strength test measures tensile strength in fibers and woven fabrics. The bursting test evaluates fabric strength under internal pressure. The reflection test via spectrophotometer measures light reflection for color analysis. GSM tests determine fabric weight per unit area, indicating changes in thickness, density, and quality. The absorbency test gauges fabric scouring effectiveness and absorption capacity, crucial for enhancing overall quality.

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Chapter – 1

Introduction

1.1 Background of the Study

The textile industry, a pivotal player in global manufacturing, has undergone substantial transformations throughout history, contributing significantly to the economic progress of nations. Originating from ancient civilizations, textiles have transitioned from manual craftsmanship to a highly automated and technologically advanced sector. Within this dynamic context, the scouring and bleaching processes assume crucial roles. Scouring, the initial phase of textile processing, entails the removal of impurities like natural waxes, oils, and dirt from raw fibers, enhancing the fabric's absorbency and dyeability. In contrast, bleaching, occurring subsequently, eliminates residual color and impurities, resulting in a pristine and vibrant textile, ready for dyeing or finishing. The importance of these procedures extends beyond aesthetic enhancements, encompassing the assurance of textile quality, durability, and functionality. In response to escalating consumer expectations for sustainable and high-performance textiles, the optimization of scouring and bleaching techniques remains pivotal for meeting these demands and sustaining the textile industry's competitive position.

1.2 Aim of the Study

The main objective of this study is to systematically examine and measure the physical transformations experienced by fabric during scouring and bleaching processes. The focus will be on understanding changes in various physical characteristics such as texture, weight, thickness, color, and surface morphology.

1.3 Objectives:

- **Raw Fabric Characterization:** Perform a detailed assessment of the initial physical properties of the untreated fabric, encompassing texture, weight, thickness, color, and surface features.
- **Analysis of Scouring Process:** Investigate the impact of scouring on the fabric by analyzing alterations in its physical attributes. This includes monitoring changes in texture, weight, thickness, color, and surface morphology post-scouring.
- **Analysis of Bleaching Process:** Examine the effects of the bleaching process on the fabric's physical properties. Specifically, scrutinize variations in texture, weight, thickness, color, and surface features following the bleaching treatment.
- **Comparative Examination:** Conduct a comprehensive comparative analysis of the fabric's physical characteristics before and after scouring and bleaching. Identify and quantify the extent of changes in each parameter.
- **Impact on Fabric Performance:** Investigate how the observed physical alterations influence the overall performance and functionality of the fabric. Evaluate factors such as tensile strength, colorfastness, and durability to comprehend the practical implications of scouring and bleaching.

- **Optimization Recommendations:** Propose potential optimization strategies for the scouring and bleaching processes based on the findings. Provide suggestions for modifications that can enhance desired outcomes while minimizing any adverse effects on the fabric's physical properties.

1.4 Scope

This research aspires to significantly contribute to the textile industry by providing a comprehensive understanding of the physical changes occurring in fabric due to scouring and bleaching processes. The findings are anticipated to have practical implications for enhancing textile processing methods, ensuring product quality, and promoting environmentally sustain.

Fabric Properties: The study will focus on exploring changes in fundamental fabric properties such as tensile strength, elongation, and fabric weight.

Analysis of dimensional stability, including changes in fabric width, length, and shrinkage, will be undertaken to understand the impact of scouring and bleaching.

Surface Morphology: Microscopic examinations using techniques like scanning electron microscopy (SEM) will be employed to evaluate alterations in the surface morphology of the fabric. This will include an investigation of fiber structure and surface irregularities.

Color Analysis: Spectrophotometric analysis will be conducted to quantify color changes in the fabric before and after scouring and bleaching. This will involve studying parameters such as color strength, hue, and brightness.

Chemical Composition: The study will analyze changes in the chemical composition of the fabric by employing techniques like Fourier-transform infrared spectroscopy (FTIR) or X-ray diffraction (XRD) to identify modifications in molecular structures induced by scouring and bleaching.

Water & Dye Absorption Properties: The research will delve into alterations in water absorption properties, investigating parameters such as water repellency, moisture regain, and capillary rise of the fabric.

Environmental Impact: Consideration will be given to the environmental implications of scouring and bleaching processes. This includes the assessment of chemical usage, wastewater generation, and potential environmental impacts associated with these treatments in able practices within the industry.

1.5 limitation

Limitations of the study:

Study Focus: This thesis predominantly concentrates on the observable alterations in fabric pre and post scouring and bleaching processes, omitting an exploration into the chemical or molecular dimensions of these procedures. This narrow focus constrains a holistic comprehension of the complete transformation.

Textile Diversity: The research is centered on a particular fabric type, potentially limiting the direct applicability of findings to diverse textiles. Variations in fabric composition, weave, and finishing techniques may lead to diverse outcomes, aspects not thoroughly investigated in this thesis.

Environmental Oversight: The study does not thoroughly incorporate environmental conditions during scouring and bleaching, such as temperature and humidity. These factors are influential and inadequately considered in this research, potentially impacting the validity of outcomes.

Temporal Constraints: Due to time limitations, the study may lack an exploration of long-term effects post scouring and bleaching. A more protracted investigation could reveal insights into the fabric's endurance and stability over extended periods.

Methodological Dependencies: The thesis relies on specific equipment and techniques for analysis, potentially introducing limitations related to tool availability or precision. This could affect result accuracy and the broader applicability of findings.

Comparative Narrowness: While the thesis scrutinizes changes pre and post scouring and bleaching, it lacks an extensive comparative analysis with alternative textile treatment methods. A more comprehensive examination could yield a nuanced understanding of the pros and cons of various approaches.

Human Variables: The thesis overlooks potential human factors in manufacturing processes, like variations in scouring and bleaching agent application by operators. Human errors or inconsistencies in application methods might influence the observed physical changes in the fabric.

Future research endeavors should address these limitations to enhance our understanding of the physical changes in fabrics during scouring and bleaching processes.

Chapter – 2

Literature Review

2.1 Concept of pretreatment

In the realm of textile wet processing, pretreatment stands as a crucial stage in the overall textile processing. It serves to eliminate impurities, rendering the fabric more absorbent, white, and conducive to subsequent processing. Various processes, such as singeing, de-sizing, scouring, and bleaching, are applied in pretreatment to prepare textile materials for printing and dyeing.

The primary objective of pretreatment is the removal of impurities, including natural fiber colors, sizing materials, oils, waxes, starch, spots, seed particles, and other contaminants. These impurities can adversely affect the fabric's absorbency, visual appearance, shade development, dye affinity, and overall handle. For instance, during the weaving of cotton yarns into fabrics, sizing treatment is employed to enhance yarn strength for withstanding tension during weaving. However, the sizing paste, comprising starch, oils, and lubricating materials, hampers fabric absorbency, leading to defects like spots and oil marks.

To ensure optimal dyeing, printing, or finishing effects, it becomes imperative to eliminate these external substances from the fabric. Therefore, the pretreatment processes play a pivotal role in achieving high-quality textiles by addressing these issues and preparing the fabric for subsequent processing stages.

Purposes of fabric pre-treatments:

- Elimination of impurities and undeveloped fibers in the fabric
- Enhancement of uniform dye absorption capability
- Improvement of moisture absorbency and hydrophilic properties
- Attainment of the necessary level of whiteness for precise shade development
- Enhancement of fabric softness, handle, luster, feel, and texture.[1]

2.2Pretreatment Process Flow Chart of Textile Materials

To achieve colored fabric, whether through printing or dyeing, it is essential to undergo pretreatment processes before the actual printing and dyeing stages. The necessary pretreatment procedures for textile materials are outlined follows:"

Grey cloth or fabric

↓

Stitching
↓
Singeing
↓
De-sizing
↓
Scouring
↓
Bleaching
↓
Mercerization
↓
Washing
↓
Drying.

2.3 All pretreatment process have explained in the below

2.3.1. Grey Cloth or Fabric Inspection

This marks the initial step in the textile pretreatment sequence. It involves the collection and examination of fabric to identify and address any defects or faults.

2.3.2. Stitching:

Fabrics are connected in this stage to facilitate subsequent textile pretreatment processes.

2.3.3. Singeing:

To eliminate protruding hairy fibers from the surface of the grey fabric, the singeing process is employed. The fabric passes through a gas flame, burning out fibers on both sides. This enhances fabric brightness and color luster, contributing to improved results in subsequent printing or dyeing processes.

2.3.4. De-sizing:

The removal of starch materials from the grey fabric is achieved through de-sizing. Enzymes are commonly used to degrade and eliminate starch. If these sizing materials are not removed, subsequent chemical treatments may be uneven, leading to defective dyeing and printing.

2.3.5. Scouring:

This process focuses on eliminating natural impurities present in cotton fibers, such as pectins, pectose, ash, wax, and mineral compounds. Failure to remove these impurities can hinder uniform fabric dyeing or printing. Caustic soda and soda ash are typically used as the main reagents in the scouring process for cotton fabric.

2.3.6. Bleaching:

Bleaching involves the removal of natural coloring matters from the fabric using agents like hydrogen peroxide or bleaching powder. Hydrogen peroxide is a commonly used and effective bleaching agent. Skipping this bleaching treatment before printing or dyeing can lead to challenges in color yield and shade matching.

2.3.7. Mercerization:

A specialized chemical pre-treatment, mercerization improves fabric properties and performance. This process involves treating the fabric under tension in a 20% caustic soda solution. Mercerization enhances fabric strength, absorbency, luster, handle properties, reduces dye and chemical consumption in the dyeing process.

2.3.8. Washing:

Following the completion of the above processes, the treated fabric undergoes washing with hot and cold water. Sometimes, a soap solution may be employed in this stage.

2.3.9. Drying:

The treated fabric is dried using various types of drying machines in the final step of the pretreatment process."

2.4 Scouring

Scouring is a method employed to eliminate all inherent and incidental impurities, such as oil, wax, and fat, from textile materials, particularly cotton, resulting in a hydrophilic and pristine fabric. This process serves as a preparatory step for dyeing and finishing cotton fabric. The primary objective of cotton scouring is the removal of both natural and synthetic impurities, enhancing the cleanliness and absorbency of the fabric.

Cotton fabric scouring is a chemical cleaning technique designed to eliminate natural waxes and non-fibrous impurities from fabrics, along with any additional soiling or dirt. Typically, the scouring of cotton fabric takes place in kiers, large iron vessels optimized for this purpose.[i]

2.4.1 Objectives/purpose of Scouring:

- Elimination of natural and synthetic oils, fats, and waxes from textile products
- Enhancement of hydrophilicity
- Improvement of absorbency
- Preparation for subsequent processing stages
- Attainment of uniform bleaching results

2.5 Flow chart of cotton scouring:

Cotton fabric/fiber

↓

Inspection

↓

Wetted by NaOH solution

↓

Emulsification

↓

Detergency

↓

Washing

↓

Scoured fabric

2.6 Scouring Parameters

Raw Materials and other inputs

2.6.1 Water Quality

Hardness

Bi-carbonate

Carbonates sulphates and chloride

TDS (Total Dissolved Solids)

Turbidity

Other metals –iron, copper

2.6.2 Quality of Auxiliary Chemicals used.

b. Quality of surfactants like wetting, scouring agents

Wetting time of wetting agents

Solid content

Ionic nature

Cloud point of non-ionic products

Foaming characters

c. Quality of sequestering agents

Chelating power

pH

Solid content

2.6.3 Quality of Basic Chemicals used and its concentration

Caustic soda – purity and concentration percentage

Soda Ash – purity and concentration

2.6.4 Effect of Time and Temperature

Time and temperature of scouring are interrelated. As the temperature increases, less time is needed. The scouring performance is accelerating at high temperature.

2.6.5 Concentration

Concentration is also interrelated with time and temperature. Higher concentrations require less time and temperature.

2.6.6 Effect of PH

PH has a profound effect on scouring with caustic soda. The optimum PH for scouring is between 10.5 and 11.5.

2.6.7 Material liquor ratio

Higher material liquor needs high time and temperature. It also needs more chemical, later on more load on ETP. Overall cost also become high due to high material liquor ratio and vice versa.[2]

2.7 Chemical & it's function

Table 2.1: Chemical function

Chemicals	**Functions**
Caustic soda (NaOH)	Neutralizes acidic materials, saponifies glycosides (waxes & oils).
Soda ash (Na2CO3)	Acts as a weak alkali to achieve the required alkali percentages with low concentration.
Surfactant (T.R oil)	Reduces surface tension and interfacial tension, aiding in wetting out materials with liquid.
Sequestering agent (EDTA)	Deactivates metal ions.
Detergent (Lisapol)	Emulsifies fats, oils, and waxes; removes oil-borne stains; suspends materials after they have been removed.

2.8 Typical Recipe for Scouring of Cotton:

Table 2.2:Typical Recipe for Scouring of Cotton.

Chemical	**Amount (gm/l)**
Wetting agent	0.5-1.0 gm/l (Stock solution 1%)

Detergent	1.0-2.0 gm/l (Stock solution 1%)
Sequestering agent	1.0-3.0 gm/l (Stock solution 1%)
Caustic soda	2.0-4.0 gm/l (Stock solution 1%)
Temperature	95-100^{0}C
Time	15-45 min
pH	10.5-11.0
M:L	1:20
Sample Weight	5 gm

2.9 Bleaching Process

The bleaching process is a vital step in the wet processes of the textile industry, serving as a crucial pretreatment for dyeing and printing. It's a chemical endeavor that involves removing the natural color from fabrics, transforming them into a pristine white canvas. Textile mills employ this process to achieve bright and vibrant results. Beyond aesthetics, bleaching also enhances the absorbency capacity of fabrics.

Preceded by the scouring process and followed by mercerization just before dyeing, bleaching plays a pivotal role in the overall wet process of textiles. The chemistry behind bleaching is intricate and essential to achieving the desired outcomes. By chemically altering the fabric, the bleaching process not only eliminates natural colors but also contributes to the fabric's overall brightness.

The ultimate result is a grey fabric transformed into a brilliant, white masterpiece. This article delves into the intricate chemistry behind the bleaching process in the textile industry's wet processes, shedding light on the scientific intricacies that make it a crucial aspect of textile production. I hope you find this exploration into the chemistry of bleaching in the textile industry fascinating.[2]

2.10 Objectives.

- Eliminating the natural color of the fabric.
- Achieving a lasting and radiant white appearance for the fabric.
- Enhancing the absorbency capabilities of the cloth.
- Augmenting the fabric's affinity for dyes.
- Ensuring uniform dye absorption for consistent coloring.
- Preparing the fabric to seamlessly undergo subsequent processes.

2.11 Process flow chart of Bleaching

Singed goods are put through a rapid de-size steamer

↓

Washing

↓

Impregnation is done with 3% mild solution of caustic soda

↓

Pulled up into a J-box – Temperature is maintained at 1000 C

↓

Fabric is hauled out of the J-box

↓

Hot wash

↓

Impregnation is done with 2% solution of hydrogen peroxide

↓

Put in a second J-box for another hour

↓

Washing

↓

Fabric to the driers

2.12 Types of bleaching Agent

Textile bleaching agents can be categorized into two types: oxidizing and reducing agents.

Oxidizing Bleaching Agent:

These chemical agents employ oxidizing reactions to eliminate coloring materials from textile materials, resulting in a pure white and bright appearance while enhancing absorbency. Examples include O_3, $Ca(OCl)Cl$, H_2O_2, $NaOCl$, $Ca(OCl)_2$, $K_2Cr_2O_7$, among others. Typically, natural vegetable fibers undergo bleaching with these agents.

Reducing Bleaching Agent:

On the other hand, reducing bleaching agents use reduction reactions to remove coloring materials from textile materials, imparting a pure white and bright finish and increasing absorbency. Examples include H_2S, $FeSO_4$, $NaHSO_4$, Na_2SO_4, primarily used for protein fibers such as silk and wool.

2.13 Bleaching Parameters

1. Concentration of the chemical.

2. Material-to-liquor ratio (M : L ratio).

3. pH level of the liquor.

4. Temperature of the liquor.

5. Duration of the treatment.

6. Presence of catalysts.

2.14 Typical Recipe

NaOCl (Chlorine Bleaching Agent):

The process involves chemical bleaching to remove color and enhance fabric properties. Key details include:

NaOCl concentration: 3 to 5 gm/L

pH range: 9 to 11

Temperature: 30℃

Treatment time: 30 minutes at pH 9 for continuous process; 4 hours at pH 11 for batch process

Caution: Excessive NaOCl concentration (>8%) leads to cotton degradation.

$NaClO_2$ (Next Bleaching Agent):

This milder agent, used under acidic pH, is suitable for polyester but less so for cotton. Key parameters include:

$NaClO_2$ concentration: 1-2%

Mild acid for pH adjustment (maintained at 3-4)

Treatment time: 1-2 hours

Temperature: 90 to 100℃

H_2O_2 (Hydrogen Peroxide Bleaching):

Widely used in the industry, H_2O_2 is environmentally friendly and produces no byproducts. Key factors include:

pH importance: pH 10.5 for cotton; 8-9 for silk and wool

Activators: Alkalis like NaOH, Na_2CO_3, Na_3PO_4, TSP, and NH_3

Stabilizers: Salicylic Acid and Sodium Silicate for prolonged peroxyl ion life

Concentrations: Available in 50%, 35%, and 30%; metal ion sensitivity requires water and fabric to be metal-free

Recipe

H_2O_2 (50% conc.): 1-2% (OWF), NaOH (Activator), Sodium Silicate (Stabilizer), Non-ionic Surfactant, and EDTA (Metal Chelating Agent)

Treatment time varies with temperature, with a wash using acetic acid post-H_2O_2 bleaching.

Overall, understanding the intricacies of these bleaching agents and their respective recipes is essential for achieving desired fabric outcomes.[2]

2.15 Faults in Bleaching and Their Remedies

1. Incomplete and irregular bleaching

2. Excessive bleaching

3. Weakening of the fabric

4. Rough texture in the textile material

5. Yellowish discoloration on the textile material

To address these problems:

1. Ensure thorough and uniform bleaching.

2. Avoid over-bleaching to prevent excessive treatment.

3. Take measures to maintain fabric strength.

4. Address any roughness in the textile material.

5. Implement strategies to eliminate or reduce yellowish discoloration on the fabric.

To assess the efficacy of scouring and bleaching processes, the whiteness of the bleached fabric is evaluated using a spectrophotometer (Datacolor 400) with a 100 observer and D65 illuminant for determining the whiteness index.

2.16 Measurement of Scouring & Bleaching Effect

For scouring effect estimation, various tests are conducted, including:

Determination of weight loss.

Absorbency test through immersion, drop, or spot tests, and wicking/column test.

Measurement of protein content.

Measurement of wax content.

Measurement of Methylene blue absorption.

Measurement of Copper number.

Immersion Test: A 1cm x 1cm fabric sample is placed on the water surface, and the time it takes for the fabric to immerse is recorded using a stopwatch. The standard time for immersion is 5 seconds.

Additionally, bursting strength is measured using a Diaphragm Bursting Tester:

Diaphragm Bursting Tester: Fabric is clamped over a rubber diaphragm with an annular clamping ring, and fluid pressure is applied until the specimen bursts. The test uses two specimen sizes, with no direct comparison between the results obtained from different sizes. The standard requires testing ten specimens, and the pressure is increased to ensure bursting within 20 ± 3 seconds.

Finally, the gram per square meter (GSM) of each sample is measured using a GSM cutter. Certainly, let's break it down with more specificity:

2.17 Physical Properties of Fabrics:

1.Fiber or Filament:

-Type, size, length.

2. Yarn:

- Diameter, twist, weight or size, count, fiber content for mixed yarns, ply.

3. Weight:

- Ounces per square yard or yards per pound.

4. Thickness:

- Vertical depth.

5. Fabric Structure:

- Woven fabrics: weave type, warp and filling yarn count per linear inch.

- Knitted fabric: knit type, wale, and course count per inch.

6. Finishes:

- Chemicals (resins, starches, waxes) and mechanical effects (calendaring, napping) for style, durability, and utility.

7. Fabric Width:

- Length of the filling or course.

8. Color:

- Hue, value, and intensity (degree of brilliance).

9. Fabric Density:

- Weight per unit of volume.

10. Surface Contour:

- Geometric dimension of the surface plane.

2.18 Physical Characteristics of Fabrics:

1. Style Characteristics:

- Changes affecting emotional appeal.

- Hand characteristics: tensile compression, molding, supporting forces.

- Tactile characteristics: changes in surface contour under tactile pressure.

- Visual characteristics: changes in color values with fabric or light movement.

2. Utility Characteristics:

- Changes in fit, comfort, and wearing functions.

- Transmission characteristics: air permeability, heat transmission, light permeability, moisture transmission, radioactivity transmission.

- Transformation characteristics: alterations without fabric destruction (colorfastness, crease resistance, crock resistance, etc.).

3. Durability Characteristics:

- Capacities to maintain style and utility during wear.

- Measures of stress and fabric destruction:

    - Abrasive strength.

    - Bursting strength.

    - Launderability.

    - Tearing strength.

    - Moth resistance.[2]

- Tensile strength.
- Radiation absorption strength.
- Fire resistance.
- Corrosive strength.
- Dry cleaning durability.

These properties and characteristics collectively define the dynamic and static dimensions of fabrics, encompassing their structure, appearance, and performance.

CHAPTER-3

Experimental details

3.1. Scouring:

The scouring process is carried out before dyeing, aiming to eliminate both natural and introduced impurities from the fabric.

3.1.1 Purpose of Scouring :

- The primary goal of scouring is to eliminate impurities from textile materials, rendering them highly hydrophilic.
- This ensures the material's substantial absorption of textile products without undergoing any chemical or physical damage.
- In the case of cotton, the scouring process is particularly effective in eliminating non-cellulosic components.

3.2 Bleaching :

Bleaching is a chemical process used to eliminate natural pigments from a material. The primary objective of bleaching is to achieve a consistently pure and permanent white color in the fabric.

3.2.1 Purpose of bleaching :

- Eliminate the natural color of the fabric.
- Achieve a lasting, Permanent white color in the fabric.
- Enhance the cloth's ability to absorb liquids.
- Improve the fabric's acceptance to dyes.
- Ensure uniform and consistent dyeing across the fabric.

3.3 Recipe of Scouring & Bleaching :

Table3.1: Recipe of Scouring & Bleaching.

Chemicals Name	**Amount**
Sequestering Agent	1.5 ml /L
Detergent	1 ml /L
NaOH	3 gm/L
H2O2	4 ml/L

Peroxide stabilizer	1 ml/L
Temperature	90—100 Degree C.
PH	13.7
M:L	1:35
Time	60 min.
Sample	15 gm.

3.4 Recipe Calculation:

Total Liquor: (15*35) = 525 ml.

Sequestering Agent: (1.5*525)/1000= 0.78 ml.

Detergent: (1*525)/1000 = 0.52 ml.

NaOH: (3*525)/1000 = 1.57 gm.

H2O2: (4*525)/1000 = 2.1 ml .

Peroxide stabilizer: (1*525)/1000 = 0.52 ml .

Initial fresh water taken (525-(0.78+0.52+0.52+2.1))=521.08 ml.

3.5 Chemicals & Apparats :

Figure 3.1: Chemicals & Digital balance.

Figure 3.2: Beker & Measuring Cylinder

Figure 3.3: Pipets   Figure 3.4:PH meter   Figure 3.5:Gas Burner

3.6 Chemicals function:

Table 3.2: Chemicals function

Chemicals Name	Function
Sequestering Agent	Melat ion deactivate of water.
Detergent	Added impurities remove from fabric.
NaOH	Natural impurities remove from fabric.
H2O2	Natural color remove & get permanent white shade .
Peroxide stabilizer	To increase activity of H2O2.

3.7 Scouring & Bleaching process flow chart :

Grey fabric inspection .

↓

Make chemical solution .

↓

Take open bath .

↓

Take solution on the open bath.

↓

Temperature increase in 90–100 degree Celsius .

↓

Run time 1 hour.

↓

Drain solution.

↓

Wash the fabric.

↓

Then dry the fabric.

3.8 After and Before Scouring ,Bleaching fabric test .

1. Weight loss Test.
2. Elmendorf Tearing Test.
3. Universal Strength Test .
4. Bursting Test.
5. Reflection Test by Spectrophotometer.
6. GSM Test.
7. Drop Test.

3.9 Weight loss Test (Working Principle)

This test measures how well or poorly the fabric scoured. Equation =

(Before weight of scouring – After weight of scouring / Before weight of scouring)*100

.

Standard weight loss rate : 4 — 8 %

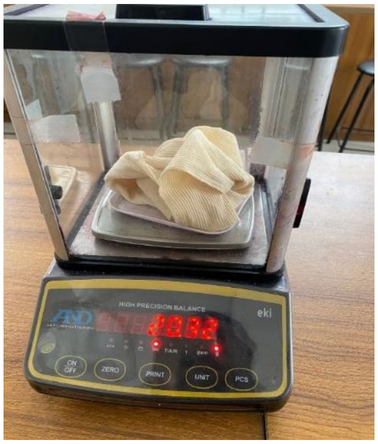

Figure 3.6: Before weight of scouring.

Figure 3.7: After weight of scouring.

3.10 Elmendorf Tearing Test (Working Principle).

- We can take sample (10*6.3 Cm) both warp & weft wise
- The fabric tear tester includes a pendulum with a fan-shaped design, featuring a movable sample clip and another clip securely attached to the frame.
- With the pendulum initially in an elevated position, the sample is fastened between the two clamps.
- Subsequently, release the pendulum. As the movable fixture separates from the fixed fixture, the sample undergoes tearing.
- A pointer, affixed to the pendulum, provides a direct reading of the tearing force.

Figure 3.8:Sample cut

Figure 3.9:Elmendorf Tearing Tester .

Figure 3.10:Pendulum scale .

3.11 Universal Strength Test (Working Principle).

- We take the sample (10*20 Cm.) Both warp & weft wise .
- To conduct a test using the Universal Strength Tester, the sample is positioned between two jaws and securely clamped for either a tension or compression test.
- After correct placement, one jaw remains stationary while the other is movable.
- Then the jaws are separated to exert tension on the sample, continuing until the sample reaches its point of fracture.

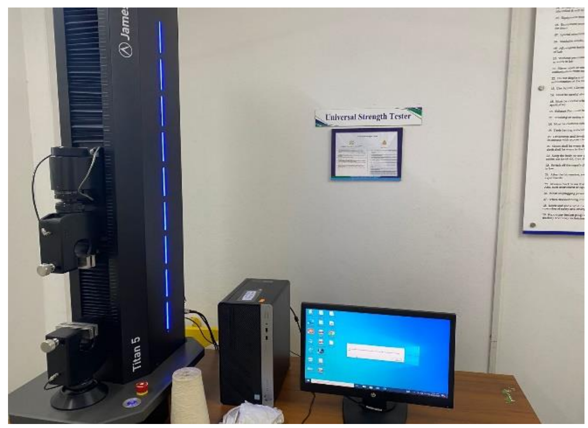

Figure 3.11: Universal Strength Tester.

Figure 3.12: 10*20 Cm Sample cut.

3.12 Bursting Test (Working Principle).

- Cut the sample according to the specimen holder's specifications.
- In short, secure the specimen by placing a ring over a diaphragm.
- Apply force using hydraulic pressure.
- Eventually, the fabric ruptures, and the pressure at that moment is reflected by the pressure gauge

Figure 3.13: Sample of Bursting Test.

Figure 3.14:Sample of Bursting Test.

3.13 Reflection Test by Spectrophotometer (Working Principle).

Spectrophotometers find widespread application across diverse industries, including textiles, paint, and food, for the precise measurement and analysis of color.

These devices function on the principle of spectrophotometry:

- wherein they gauge the intensity of light at varying wavelengths.
- The instrument emits light spanning a spectrum of wavelengths, usually within the visible light range, and the sample interacts with this emitted light.

- Subsequently, the spectrophotometer quantifies the amount of light absorbed or transmitted by the sample, providing a comprehensive assessment of its color characteristics.

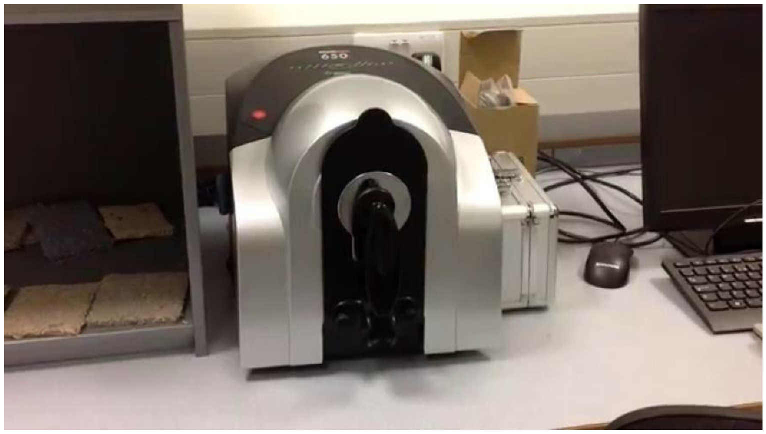

Figure 3.15 : Spectrophotometer.
Factory: Knit Concern Group, Narayanganj 1400.

3.14 GSM Test :

The weight of fabric Gram Per Square Meter that is called GSM.

- We cut the sample with the help of GSM cutter.
- Then this sample weight it with the help of Digital Balance.
- Then this weight multiplied by 100.

Figure 3.16:Digital Balance.

Figure 3.17:GSM Cutter.
(dia cm)

Figure 3.18:Digital Balance

3.15 Absorbency (Drop) Test :

This test measures how well or poorly the fabric scoured.

- At first we make 1% Red direct dye solution.
- Then the solution take into dropper.
- Only one drop solution dropped on the fabric.
- then observe absorbency of this fabric.

Figure 3.19: 1% Red direct dye solution.

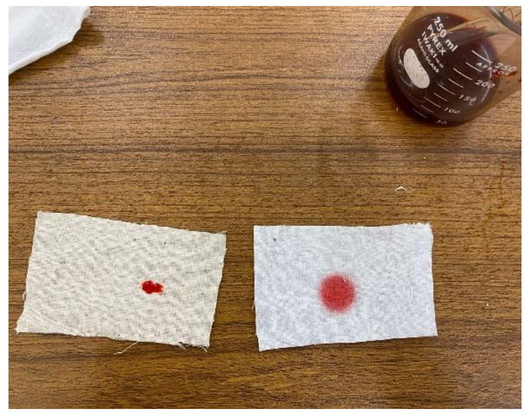

Figure 3.20: Absorbency test (Woven fabric)

CHAPTER-4

Results & discussion

4.1 Weight loss Test & Analysis :

Table 4.1 Weight loss data Analysis

No	Name	Equation	Weight loss %
1	Woven	(15.01-14.027/ 15.01)*100	6.54 %
2	Rib	(20.32 – 19.015 / 20.32)* 100	6.42%
3	Terry	(20.23-19.015/ 20.23)* 100	6 %
4	Interlock	(5.27-4.91/ 5.27)* 100	6.8 %
5	S/J	(14 – 13.265 /14)*100	5.25 %
6	Lacost	(15.525-14.674/15.525)*100	5.48 %

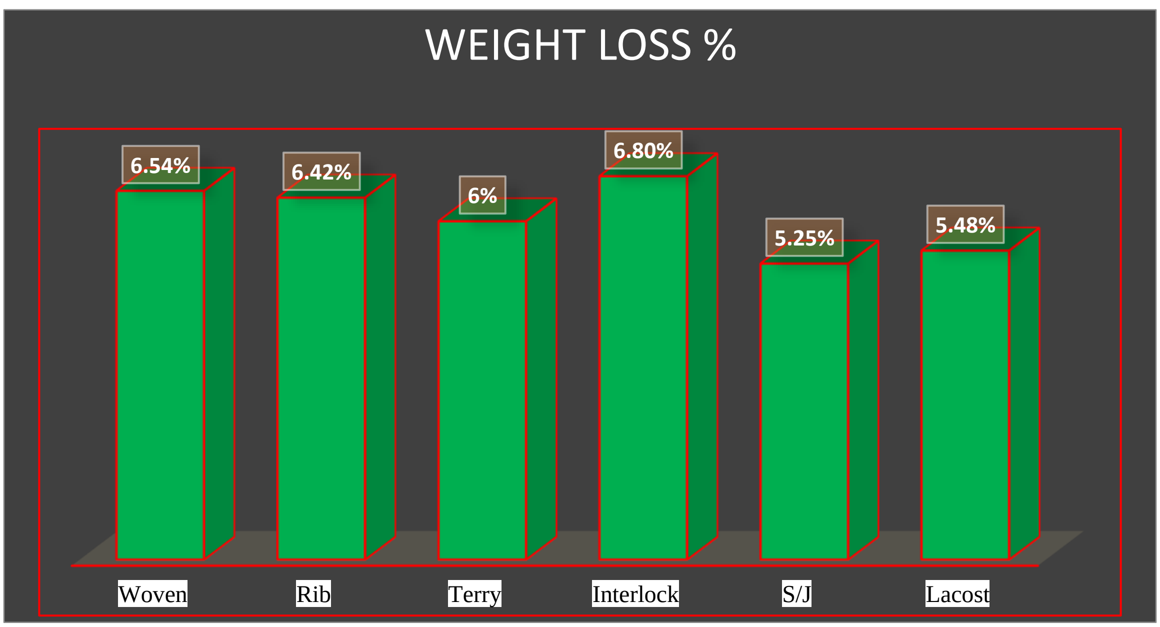

Figure 4.1 : Fabric weight loss graph

The figure shows the percentage of weight loss in different types of fabrics after scouring. The fabrics are listed on the x-axis, and the percentage of weight loss is shown on the y-axis. The bars are color-coded, with each color representing a different laundry condition. Here is a summary of the data in the figure, for each laundry condition :Woven : 6.54%

weight loss, Rib: 6.42% weight loss, Terry: 6.80% weight loss, Interlock: 6.00% weight loss, S/J: 5.25% weight loss ,Lacost: 5.48% weight loss. The type of fabric and the scoring condition both have an impact on the amount of weight loss. In general, terry cloth loses the most weight, while S/J and Lacoste lose the least weight.

4.2 Elmendorf Tearing test & Analysis.

The Elmendorf Tearing Test is a crucial evaluation in textiles to measure the tear resistance of fabrics. It assesses a fabric's ability to withstand tearing forces, making it essential for applications requiring durability, such as workwear, outdoor textiles, and industrial fabrics. Fabrics with higher tear resistance are preferred for their resilience and longevity.

Table 4.2 : Tearing test result (Woven Fabric).

Before Scouring Bleaching		**After Scouring Bleaching**	
Direction	Force	Direction	Force
Warp wise -	9 N	Warp wise -	6 N
Weft wise -	8 N	Weft wise -	4.5 N

Table 4.2: In the textile realm, the tearing test is instrumental in measuring the tensile strength of fibers and fabrics. In this woven fabric before scouring bleaching warp wise 9N and after scouring bleaching warp wise 6 N . before scouring bleaching weft wise 8N & after scouring bleaching weft wise 4.5 N .

4.3 Universal Strength Test (Woven Fabric)

ASTM D5034 (SI units)

Date: 2021

Breaking Strength and Elongation of Textile Fabrics (Grab Test)

Test Details

Test Name:	Tensile Strength	Print Date:	12/31/2023
Customer:	Mahfuzur Rahman	Jaw Separation:	75.00 mm
Reference:	Tanvir Ahmed chowdhury	Force Control Gain:	25
Material:	Plain woven	Jaw Pressure:	100
Comments:	Before Scouring & Bleaching	Load Cell:	5000 N
Specimens:	1	Load Cell SN:	1126095
Required Directions:	Both	Version:	11.0.3.0
Test Time:	5:26 PM	Firmware:	v1.00p36
Test Date:	12/31/2023	Titan SN:	1710/05/21/1197
Jaw Scheme:	T27	Tested by:	Administrator

Procedure Settings

Break Detection: 10 %

Pretension

Pretension: 0N

Pull To Load Cell Maximum

Speed: 300.00 mm/min

Warp Results

Specimen	Max Force (N)	Extension (%)
1	241.01	19.58

Weft Results

Specimen	Max Force (N)	Extension (%)
1	192.07	16.57

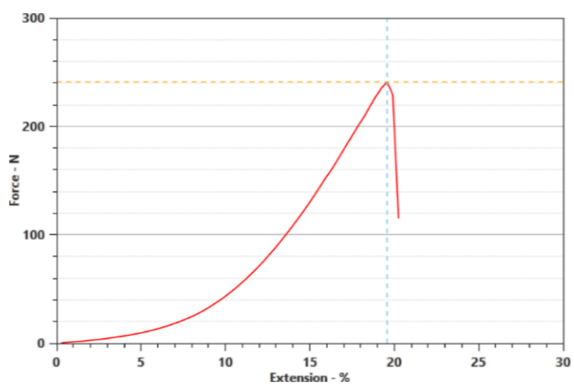

Figure 4.2 : Warp Graph

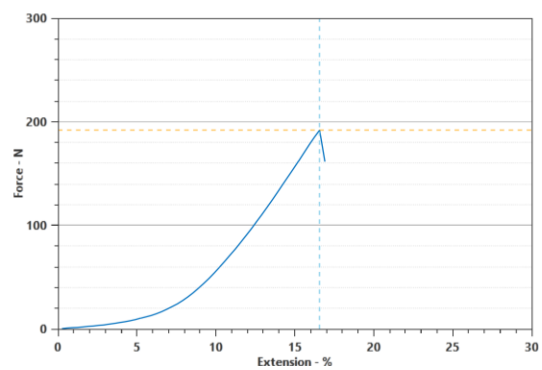

Figure 4.3: Weft Graph

ASTM D5034 (SI units)

Date: 2021

Breaking Strength and Elongation of Textile Fabrics (Grab Test)

Test Details

Test Name:	Tensile Strength	Print Date:	12/31/2023
Customer:	Mahfuzur Rahman	Jaw Separation:	75.00 mm
Reference:	Tanvir Ahmed Chowdhury	Force Control Gain:	25
Material:	Plain Woven	Jaw Pressure:	100
Comments:	After Scouring & Bleaching	Load Cell:	5000 N
Specimens:	1	Load Cell SN:	1126095
Required Directions:	Both	Version:	11.0.3.0
Test Time:	5:31 PM	Firmware:	v1.00p36
Test Date:	12/31/2023	Titan SN:	1710/05/21/1197
Jaw Scheme:	T27	Tested by:	Administrator

Procedure Settings

Break Detection: 10 %

Pretension

Pretension: 0N

Pull To Load Cell Maximum

Speed: 300.00 mm/min

Warp Results

Specimen	Max Force (N)	Extension (%)
1	163.72	20.57

Weft Results

Specimen	Max Force (N)	Extension (%)
1	145.55	17.58

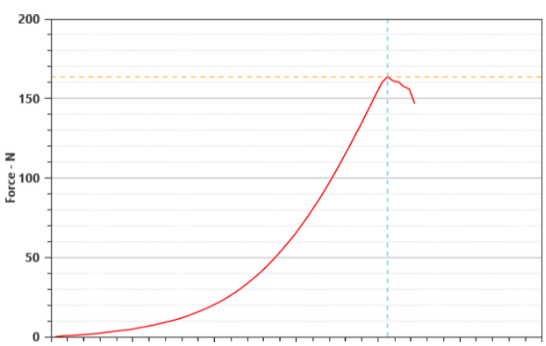

Figure 4.4 : Warp Graph

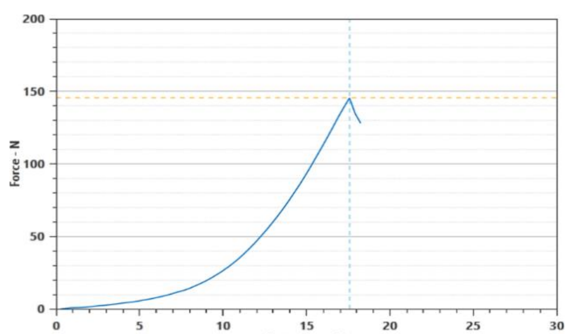

Figure 4.5: Weft Graph

4.4 Bursting Test (Knit Fabric)

EN ISO 3303-

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur	Force Control Gain:	100
Reference:	Tanvir Ahmed Chowdhury	Jaw Pressure:	100
Material:	S/J	Load Cell:	5000 N
Comments:	After Scouring & Bleaching	Load Cell SN:	1126095
Specimens:	1	Version:	11.0.3.0
Required Directions:	Dry	Firmware:	v1.00p36
Test Time:	5:51 PM	Titan SN:	1710/05/21/1197
Test Date:	12/31/2023	Tested by:	Administrator
Jaw Scheme:	T20A		

Procedure Settings

Break Detection: 50 %

Pretension

Pretension: 0N

Pull To Load Cell Maximum

Speed: 300.00 mm/min

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	301.20	122.17	-

EN ISO 3303-1

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur	Force Control Gain:	100
Reference:	Tanvir Ahmed Chowdhury	Jaw Pressure:	100
Material:	S/J	Load Cell:	5000 N
Comments:	Before Scouring & Bleaching	Load Cell SN:	1126095

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	392.30	123.92	-

EN ISO 3303-1

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur	Force Control Gain:	100
Reference:	Tanvir Ahmed Chowdhury	Jaw Pressure:	100
Material:	Rib	Load Cell:	5000 N
Comments:	Before Scouring & Bleaching	Load Cell SN:	1126095
Specimens:	1	Version:	11.0.3.0
Required Directions:	Dry	Firmware:	v1.00p36
Test Time:	5:51 PM	Titan SN:	1710/05/21/1 197
Test Date:	12/31/2023	Tested by:	Administrator
Jaw Scheme:	T20A		

Procedure Settings

Break Detection: 50 %

Pretension

Pretension: 0N

Pull To Load Cell Maximum

Speed: 300.00 mm/min

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	375.32	127.68	-

EN ISO 3303-1

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur	Jaw Separation(s):	100.00
Reference:	Tanvir Ahmed Chowdhury	Force Control Gain:	100
Material:	Rib	Jaw Pressure:	100
Comments:	After Scouring & Bleaching	Load Cell:	5000 N

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	330.17	123.67	-

EN ISO 3303-1

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur	Force Control Gain:	100
Reference:	Tanvir Ahmed Chowdhury	Jaw Pressure:	100
Material:	Lacost	Load Cell:	5000 N
Comments:	Before Scouring & Bleaching	Load Cell SN:	1126095
Specimens:	1	Version:	11.0.3.0
Required Directions:	Dry	Firmware:	v1.00p36
Test Time:	5:51 PM	Titan SN:	1710/05/21/1197
Test Date:	12/31/2023	Tested by:	Administrator
Jaw Scheme:	T20A		

Procedure Settings

Break Detection: 50 %

Pretension

Pretension: 0N

Pull To Load Cell Maximum

Speed: 300.00 mm/min

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	378.00	138.43	-

EN ISO 3303-1

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur	Force Control Gain:	100
Reference:	Tanvir Ahmed Chowdhury	Jaw Pressure:	100
Material:	Lacost	Load Cell:	5000 N
Comments:	After Scouring & Bleaching	Load Cell SN:	1126095

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	284.55	134.68	-

EN ISO 3303-1

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur Rahman	Force Control Gain:	100
Reference:	Tanvir Ahmed Chowdhury	Jaw Pressure:	100
Material:	Terry	Load Cell:	5000 N
Comments:	Before Scouring & Bleaching	Load Cell SN:	1126095
Specimens:	1	Version:	11.0.3.0
Required Directions:	Dry	Firmware:	v1.00p36
Test Time:	5:51 PM	Titan SN:	1710/05/21/1 197
Test Date:	12/31/2023	Tested by:	Administrator
Jaw Scheme:	T20A		

Procedure Settings

Break Detection: 50 %

Pretension

Pretension: 0N

Pull To Load Cell Maximum

Speed: 300.00 mm/min

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	447.09	123.43	-

EN ISO 3303-1

Date: 2020

Rubber- or plastics-coated fabrics - determination of bursting strength - Steel-ball method

Test Details

Test Name:	Ball Bursting	Print Date:	12/31/2023
Customer:	Mahfuzur Rahman	Force Control Gain:	100
Reference:	Tanvir Ahmed Chowdhury	Jaw Pressure:	100
Material:	Terry	Load Cell:	5000 N
Comments:	After Scouring & Bleaching	Load Cell SN:	1126095

Dry Results

Specimen	Rupturing Force (N)	Extension at Break (mm)	Observations
1	391.25	120.18	-

Table 4.3 Before Scouring & Bleaching Of Bursting test

Name	Rupturing Force (N)	Extension at Break (mm)
Rib	375.32	127.68
Terry	447.09	123.43
S/J	392.30	123.92
Lacost	378.00	138.43

Table 4.4 After Scouring & Bleaching Of Bursting test

Name	Rupturing Force (N)	Extension at Break (mm)
Rib	330.17	123.67
Terry	391.25	120.18
S/J	301.20	122.17
Lacost	284.55	134.68

Figure 4.6: Before Bursting test Graph.

Figure 4.7: After Bursting test Graph.

Figure 4.6: Before Bursting test graph,Comparison of fabric Rupturing Force (N) forces: This graph green line compares the force required to break four different types of fabric rib, terry, S/J & Lacost .The Y-axis represents the force applied in Newtons (N). Each green line shows the Rupturing Force required to break . The Terry fabric extension requires the most force (around 450 N) to break, making it the strongest. The S/J fabric extension requires less force (around 400 N) to break than the Lacost fabric, The rib fabric extension requires the least force (around 375 N) to break, making it the weakest of the four fabric.

This graph Red line shows the extension at break of different fabric.The x-axis shows the type of fabric and the y-axis shows the extension at Break (mm).The Lacost fabric is more extension (around 140mm). The Rib fabric less extension (around 130 mm) then Lacost Fabric . Terry & S/J Fabric lowest extension (around 125 mm).

Figure 4.7: After Bursting test Graph, This graph green line shows compares the Rupturing force required to break to different fabric.The x-axis shows the type of fabric and the y-axis shows the rupturing force in Newtons (N).The "Terry" fabric requires more force (around 400 N) to break, making it stronger.Rib & S/j fabric weaker then terry fabric. Lacost fabric breaks at a lower force (around 290N), making it weaker than the others fabric.

This graph Red line shows the extension at break of different fabric. The x-axis shows the type of fabric and the y-axis shows the extension at Break (mm).The Lacost fabric is more extension (around 135mm). The Rib & S/J fabric less extension (around 125 mm) then Lacost Fabric . Terry Fabric lowest extension. (around 120 mm).

4.5: Reflection Test by Spectrophotometer.

IIIum/Obs	D65 10 Deg

Standard: P.WOVEN DATA REPORT

Batch: 1

	GG White	GG Tint Value/Tint Deviation	Description
STD: deviation	57.16	0.00	No significant tint
BAT: deviation	71.92	0.00	No significant tint
DELTA:	14.76	0.00	

IIIum/Obs	D65 10 Deg

Standard: S/J DATA REPORT

Batch: 1

	GG White	GG Tint Value/Tint Deviation	Description
STD: deviation	63.10	0.00	No significant tint
BAT: deviation	71.58	0.00	No significant tint
DELTA:	8.84	0.00	

IIIum/Obs	D65 10 Deg

Standard: LACOST DATA REPORT

Batch: 1

	GG White	GG Tint Value/Tint Deviation	Description
STD: deviation	62.51	0.00	No significant tint
BAT: deviation	70.59	0.00	No significant tint
DELTA:	8.08	0.00	

IIIum/Obs	D65 10 Deg

Standard: INTERLOCK DATA REPORT

Batch: 1

	GG White	GG Tint Value/Tint Deviation	Description
STD: deviation	62.55	0.00	No significant tint
BAT: deviation	69.71	0.00	No significant tint
DELTA:	7.16	0.00	

IIIum/Obs	D65 10 Deg

Standard: RIB DATA REPORT

Batch: 1

	GG White	GG Tint Value/Tint Deviation	Description
STD: deviation	56.43	0.00	No significant tint
BAT: deviation	67.08	0.00	No significant tint
DELTA:	10.65	0.00	

IIIum/Obs	D65 10 Deg

Standard: TERRY DATA REPORT

Batch: 1

	GG White	GG Tint Value/Tint Deviation	Description
STD: deviation	61.85	0.00	No significant tint
BAT: deviation	69.01	0.00	No significant tint
DELTA:	7.76	0.00	

Table 4.5: Reflection Test Result.

Name of fabric	DELTA
P. Woven	14.76
S/J	8.48
Lacost	8.08
Interlock	7.16
Rib	10.65
Terry	7.76

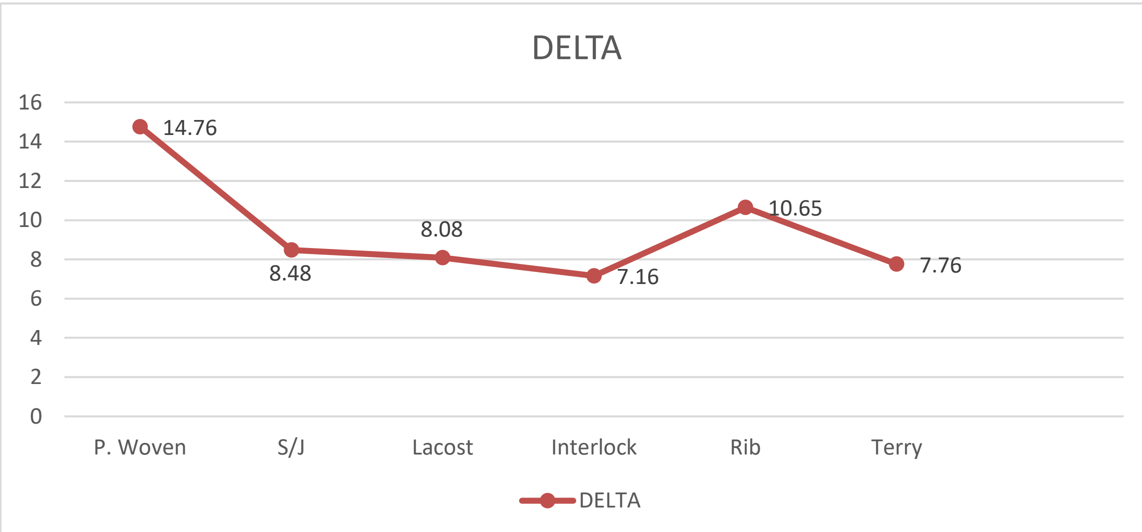

Figure 4.8 : Reflection Test Graph (DELTA value)

The graph illustrates the results of a reflection test measuring the Delta values of various fabric types. Each fabric type is listed on the x-axis, while the corresponding Delta values are represented on the y-axis. According to the test results, the Delta value for plain woven fabric is the highest at 14.76, followed by single Jersey fabric at 8.48, Lacost fabric at 8.08, Rib fabric at 10.65, Terry fabric at 7.76, and Interlock fabric at 7.16. Notably, the Delta value for P. Woven fabric is the highest among all fabric types, while Interlock fabric exhibits the lowest Delta value compared to the others.

4.6 GSM Test .

Table 4.6: GSM Test Result.

Fabric Name	Before scouring & bleaching	After scouring & bleaching
S/J	98	100
Rib	146	133
Lacost	132	133
Terry	191	198
Interlock	153	142

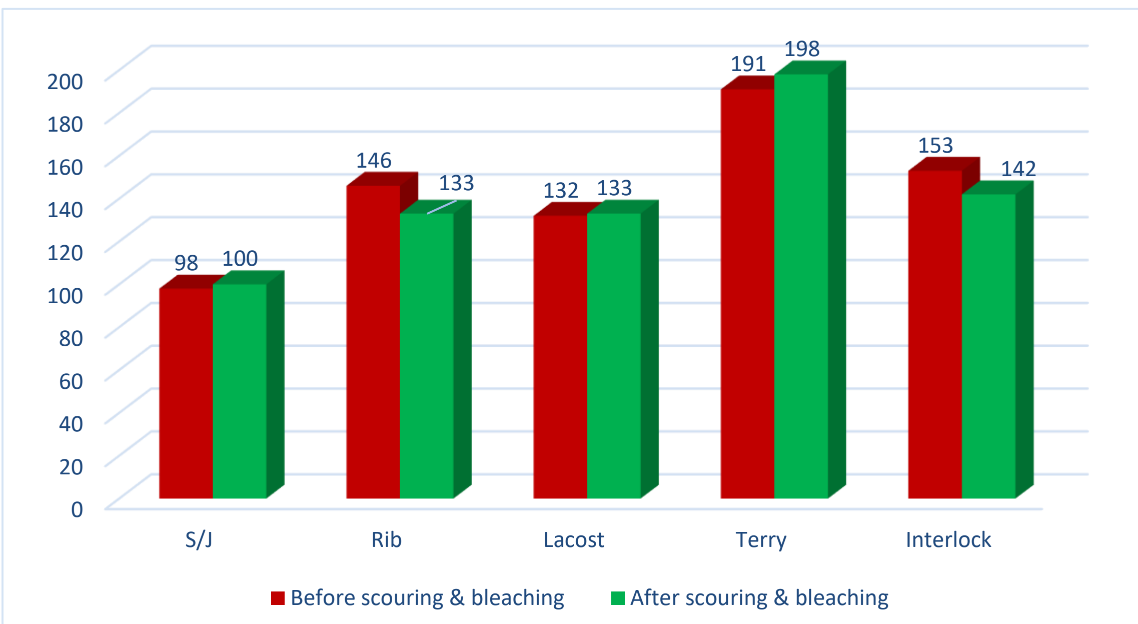

Figure 4.9: GSM test result graph ,after & before scouring bleaching .

The figure shows the GSM in different types of fabrics after &before scouring bleaching. The fabrics are listed on the x-axis, and the GSM result is shown on the y-axis. The bars are color-coded, Red colour bar is represent before scouring bleaching GSM & Green colour bar is represent after scouring bleaching . with each color representing a different laundry condition. Here is a summary of the data in the figure,S/J Fabric GSM increase ,Rib fabric GSM decrease, Lacost fabric GSM increase, Terry fabric is more increase then other fabric . Because when we iron the ribbed fabric after drying, the fabric shrinks slightly due to the heat. Thats why GSM increase , Interlock fabric GSM decrease . In this graph more decrease GSM in Rib fabric. Because Oil.Wax,Dust,etc. remove the fabric after scouring bleaching.

4.7 Drop Test.

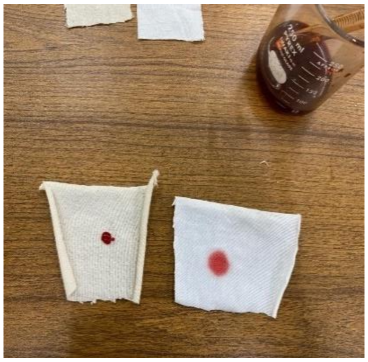

Figure 4.10: S/J fabric

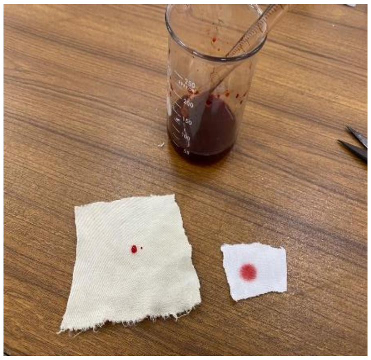

Figure 4.11:Interlock Fabric

Figure 4.12: Woven fabric

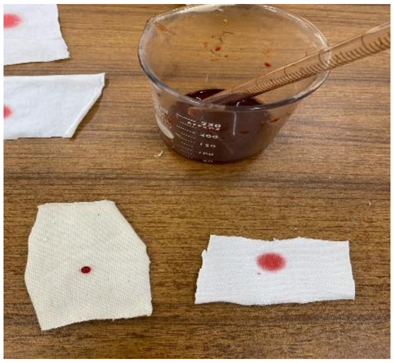

Figure 4.13: Lacost fabric

Figure 4.14: Rib fabric

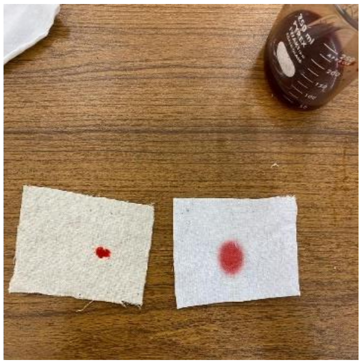

Figure 4.15:Terry fabric

Here is the drop test result , We can see all fabrics improve absorbency.

CHAPTER-5

Conclusion

Conclusion

Upon completion of this project report, we acquired a thorough comprehension of the operational procedures concerning physical changes occurring before and after scouring and bleaching. The weight loss test is a commonly employed assessment in the textile industry, aimed at evaluating the efficiency of scouring processes. The Elmendorf tearing test holds substantial importance within the textile sector, serving as a key evaluation of a fabric's tear resistance. Here we can see maximum Wt. loss fabric is Woven fabric (6.54 %) And lowest fabric is S/J (5.25 %).In the textile realm, the universal strength test is instrumental in measuring the tensile strength of fibers and Woven fabrics. Before scouring bleaching warp wise 9N and after scouring bleaching warp wise 6 N. The bursting test, particularly pertinent in the textile and paper industries, assesses the strength of fabrics under internal pressure. Here we can see before scouring & bleaching of Bursting test maximum Terry fabric in 447.09 N .After scouring & bleaching of Bursting test maximum Terry fabric in 391.25 N. .The reflection test by spectrophotometer is a widely employed method in textile industries to measure light reflection on fabrics, contributing to color analysis and quality control In this result we can see maximum P. Woven is delta value 14.76 & minimum delta value Terry fabric is .7.76. The GSM test, standard in textiles, determines the weight per unit area of fabrics. It plays a vital role in assessing fabric thickness, density, and overall quality. In this result we can observe many fabric GMS increase & many fabric decrease . Lastly, the absorbency (drop) test gauges how effectively a fabric has been scoured, determining its ability to absorb. This test is instrumental in enhancing fabric absorbency and overall quality.

This project holds significance in the domain of wet processing technology. It verifies the physical transformations that take place to before and after scouring and bleaching. Ultimately, we can conclude that this study will provide valuable insights for our future endeavors.

REFERENCE

1. https://core.ac.uk/download/pdf/236412341.pdf

   (Obtain Date: 23/12/23 Obtain time: 10:00 am)

2. .https://www.testextextile.com/textile-pretreatment-processes-singeing- desizing-scouring-bleaching-mercerizing/

   (Obtain Date: 23/01/24 Obtain time: 10:00 am)

3. http://article.sapub.org/10.5923.j.textile.20170605.02.html

   (Obtain Date: 28/01/24 Obtain time: 09:00 am)

4. http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/123456789/5779/173-23-5186%20(23_).pdf?sequence=1&isAllowed=y

   (Obtain Date: 24/12/23 Obtain time: 1:00 pm)

5. https://textilelearner.net/strength-weight-loss-cotton/

   (Obtain Date: 05/01/24 Obtain time: 10:00 am)

6. http://article.sapub.org/10.5923.j.textile.20170605.02.html

   (Obtain Date: 28/01/24 Obtain time: 09:00 am)