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Faculty of Science and information Technology
Department of Textile Engineering
B.Sc. in Textile Engineering

Project (Thesis)
on

A comparative study between bio – scouring and traditional scouring process in terms of time, cost & energy.

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DECLARATION:

We hereby declare that, this project has been done by us under the supervision of **Md. Rabiul Islam Khan, Lecturer, and Department of TE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree.

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Abstract:

Textiles have undergone wet chemical processing since time immemorial. Human ingenuity and imagination, craftsmanship and resourcefulness are evident in textile products throughout the ages; we are to this day awed by beauty and sophistication of textiles sometimes found in archaeological excavations. The paper mainly focuses on bio-scouring process, significant comparison between enzymatic and traditional scouring processes, contribution of enzyme to reduce cost and the pressure on environment and discusses some integrated Eco balancing aspects.

The aim of the work was to evaluate the effect of bio-scouring treatment on the well bleached knitted fabric to identify their weight loss %, Absorbency test. The fabric samples were treated with different concentrations of bio-scouring and traditional scouring. The results obtained show that the bio-scouring Process better than traditional scouring with respect of time, energy and environment.

Acknowledgement:

All pleasure goes to the Almighty Allah who has given us the ability and strength to complete this project.

Professor Dr. Md. Mahabubul Haque , Head, Department of Textile Engineering, daffodil International University ,whom we are extremely grateful for his tremendous support and guidance throughout our project .We are also grateful to Md. Rabiul Islam Khan, Lecturer; Department of TE, our academic supervisor.

Being working with them we have not only earned valuable knowledge but was also inspired by their innovativeness which helped to enrich our experience to a greater extent. Their ideas and way of working was truly remarkable .We believe this report could not be finished if they did not help us continuously.

Our project appreciation goes to Sahriar Jinnah Biplop for giving some Valuable information on Bio-Scouring and Traditional Scouring in his class lecture.

Last but not the least, thanks go to all the workers, supervisors who have assisted, helped and inspired us to complete this task at various stages.

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CHAPTER-01

INTRODUCTORY PART OF THE PROJECT

Introduction:

Cotton yarn on fabric, prior to dying on printing, undergo through a number of processes in a textile processing unit. A very important process is Scouring. In this process non-cellulose component from native cotton are completely on partially removed.

Scouring gives a fabric with a high and even wet ability so that it can be bleached and dyed successfully .Today highly alkaline chemicals caustic soda are used for Scouring. These chemicals are not only removing the non-cellulose impurities from the cotton, but also attach the cellulose leading to hazarded chemical result in high COD (chemical oxygen demand), BOD (Bio-chemical Oxygen demand) and TDS in the waste water.

Recently a new enzymatic Scouring process known as “Bio-Scouring” is used in textile wet-processing with which all non-cellulose structure, with lower component from native cotton are completely on partially removed. After this Bio-Scouring process, the cotton has an intact cellulose structure, with lower weight loss and strength loss. The fabric gives better wetting and penetration properties, making subsequent bleach process easy and recently giving much better dye uptake.

The application of enzymes in the textile industry in becoming increasingly popular of the mild condition of temperature and PH that are required and the capability of enzymes of replacing harsh organic chemicals.

CHAPTER-02

Theoretical foundations

Scouring:

Scouring Process involves in the treatment of textile materials in aqueous or other solutions in order to remove natural fats, waxes, proteins and other constituents, as well as dirt, oil and other impurities.

The cleaning part of the fabrics is involved in this process.

To remove pectic substances and cotton wax contained in cotton woven fabrics, the use of caustic soda (NaOH), strong alkali, is the most effective. The caustic soda has the effects of not only converting water-insoluble pectose contained in pectic substances into water-soluble pectic acid soda, but also of hydrolyzing (saponifying) cotton wax. However, a single use of the caustic soda does not provide enough penetration, emulsion, washing, and scouring powers, and so a surfactant is generally used together.

A chelating agent may also be used together to prevent insolubilization caused by calcium and magnesium

Also, a method of scouring with an enzyme instead of with the caustic soda is being considered in recent years. In this case, protopectinase is used for degrading pectin, and lipase and the like are used for degrading oil.

Scouring Agent:

Chemicals & Ingredients Used in Scouring:

- **Detergent:**

    1. **Tirkey red oil,**
    2. **Lisapol –D,**
    3. **Lisapol –C,**
    4. **Lisapol –N.**

- **Alkali:**

    1. **Sodiam Hydroxide (NaOH),**
    2. **Patasiam Hydroxide (KOH),**
    3. **Amoniam Hydroxide (NH4OH).**

- **Acid:**

    1. **Hydrochloric Acid (HCL),**
    2. **Sulfuric Acid (H2SO4),**
    3. **Acetic Acid (CH3COOH).**

- **Salt:**

    1. **Sodium Chloride (NaCL),**
    2. **Sodium Bi Sulfate (NaHSO4).**

Function of scouring agent:

Chemicals	Functions
Detergents	**Emulsify fats, oils, and waxes; remove oil borne stains;** **Suspend materials after they have been removed.**
Alkali	**Neutralizes acidic materials, saponify glycerides (waxes and oils).**
Surfactants	**Reduce surface tension and interfacial tension; helps to wet** **Out the materials with liquid.**
Sequestering agent	**Deactivate metal ion.**
Acids	**Control the pH of bath.**
Builder (Salt)	**Cause detergents to become increasingly effective.**

Scouring Auxiliaries:

The saponification of waxes / fats and oils by the use of sodium hydroxide is not enough on its own for high quality processed fabrics. Scouring agents are utilized to assist the processing of textile fibers / yarns and fabrics in conjunction with other chemicals to remove the impurities found in such forms. The main functions these products serve is to:

- Increase speed of penetration of the processing liquor into the fabrics
- Aid removal of impurities by emulsifying residual waxes / oils
- Maintain these impurities within the processing liquor and be easily rinsed out
- To sustain a minimum amount of foam thereby reducing slippage and reducing fabric processing errors

Textile chemicals large range of scouring and bleaching auxiliaries have been produced to ensure that these key stages in wet processing yield the best possible results.

How to Scouring Textile Fabric:

1. Simply wash your fabric; this includes PFD fabric, in the washing machine in hot water with Soda Ash. Do not add any fabric softeners to the wash. If you must dry your fabric do so without any fabric softener sheets
2. Using an large enamel or stainless steel pot, fill the pot at least half full and place one ounce of soda ash into the pot per pound of cotton or linen fabric/fiber.
3. Place fabric into water; swish it around using a stainless steel spoon.
4. Bring water to a boil!!!
5. Adjust heat to a low boil/hard simmer and allow to boil for two hours. stir the fabric every 15 minutes or so to make sure that the fabric is being adequately scoured
6. After two hours remove from heat source, allow fabric to cool down until the fabric is at room temperature.
7. Remove the fabric from the water and rinse.

How to work scouring process:

There are three major processes in scouring to remove these impurities.

I) Saponification: It is the process in which fats are treated with caustic which leads to the formation of hydrophilic soaps.

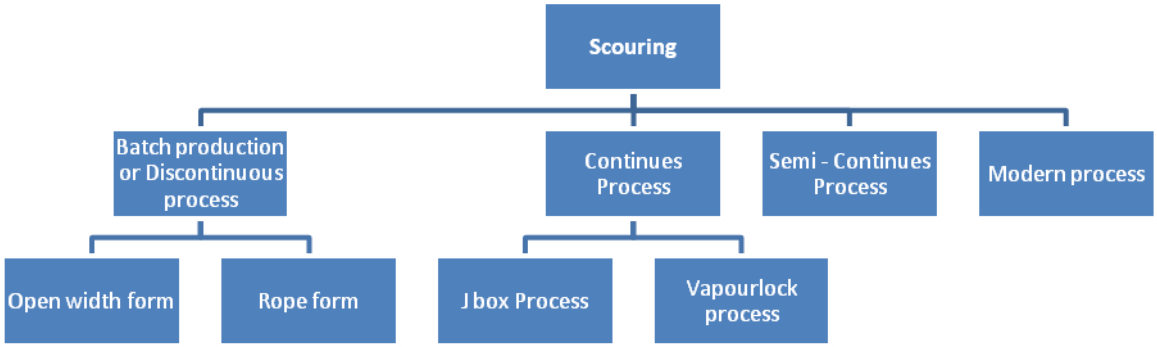
ii) Emulsification: Waxes present in the fabric cannot be removed in saponification. These are esters of higher fatty alcohol and fatty acids. Similarly mineral oils, lubricants cannot be converted to water soluble product by boiling with caustic. Thus the scouring solution must also contain an emulsifying agent. In other words a 'Surfactant'.

A surfactant is defined as a material that can greatly reduce the surface tension of water when used in very low concentrations. A particular type of molecular structure performs as a surfactant. This molecule is made up of a water soluble (hydrophilic) and water insoluble (hydrophobic) component.

In emulsification, the selection of surfactant or surfactant system will depend on the materials to be used and the properties desired in the end product. An emulsion can be oil droplets suspended in water, oil in water (O/W) emulsion, water suspended in a continuous oil phase, water in oil (W/O) emulsion, or a mixed emulsion. Selection of surfactants, order of addition and relative amounts of the two phases determine the class of emulsion.

iii) Detergency: After removal of fats by saponification and waxes by emulsification, the remaining constituents, dust and dirt particles have to be removed by a good detergent. Detergent not only removes the dirt particles but also keeps them in dispersed or suspended form in the scouring solution and does not allow them to settle on other parts of the fabric.

Types of scouring Process:



Factors upon Which Scouring Process Depends:

1. The type of fiber
2. The color of fiber
3. The cleaning ness of fiber
4. The twist of yarn

Mention the recipe of scouring for different fibers:

- **Recipe of scouring for cotton fiber:**

Caustic Soda (NaOH):		**2-5% (on the wt of fabric)**
Soda Ash (Na2Co3):		**2-3% (on the wt of fabric)**
Wetting Agent	**:**	**1% (on wt of fabric)**
M: L	**:**	**1: 20**
Temperature	**:**	**125-130° C**
Time	**:**	**6 hrs**
Pressure	**:**	**20-30 lbs\inch2**

- **Recipe of scouring for Jute fiber:**

Soda Ash (Na2Co3)	**:**	**5-10grm/lett**
Wetting agent	**:**	**0.5-1% (on the wt of fabric)**
Wetter Softening agent	**:**	**0.25 % (on the wt of fabric)**
Temperature	**:**	**80-110° C**
Time	**:**	**2-3 hrs**

- **Recipe of scouring for Regenerated Cellulose fiber:**

Soap	**:**	**0.5% (on the wt of fabric)**
Soda	**:**	**0.5-1% (on the wt of fabric)**
Detergent &Wetting agent	**:**	**1% (on the wt of fabric)**
Temperature	**:**	**50-60° C**
Time	**:**	**30-60 min**

Problems in scouring process:

- Less fiber strength
- Excessive weight loss
- Dye loss
- Energy and time concern
- Rinsing and neutralization
- Effluent concern
- Risk in chemical handling

Bio-Scouring:

Enzymatic Scouring or Bio-Scouring can simply be defined as the application of living organisms and their components to remove the natural and added impurities. It is not an industry in itself, but an important technology that will have a large impact on many industrial sectors in the future. Bio scouring firms will rely mainly on inexpensive substrates for biosynthesis, processes that will function at low temperatures, and will consume little energy and water as well. In Textile Processing the Enzymatic removal of impurities also reduces the total chemical consumptions and possibilities of accident.

Major Benefits achieved due to enzymatic scouring or bio-scouring:

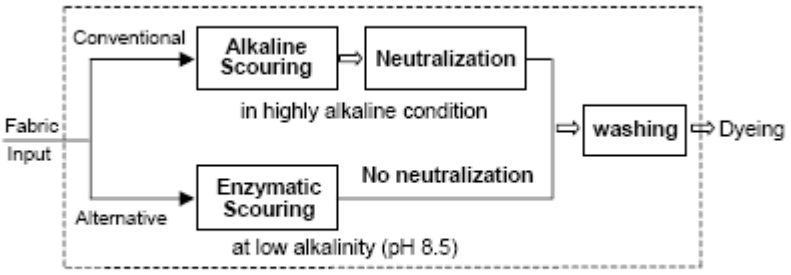


FIGURE 1 Process profiles for enzymatic versus alkaline scouring of cotton knits.

There is no need for the use of caustic soda in enzymatic scouring. So this process reduced pollution loads, high TDS, BOD and COD in the effluent.

	Enzymatic scouring	**Enzymatic scouring + bleaching with reduced concentration of hydrogen peroxide and alkali**
Reduction in rinsing water consumption	20 %	50 %
Reduction in BOD-load	20 %	40 %
Reduction in COD-load	20 %	40 %

Why Bio-Scouring: (Problems of traditional scouring)

It has become an essential demand for the mill managers to sort out an alternative for the traditional caustic scouring process for some of its unavoidable limitations:

Less fiber strength: In traditional scouring process caustic soda works on swelling method and attacks the secondary cell wall being almost pure cellulose which I have discussed earlier and it causes to damage the fiber and its strength as well.

Excessive weight loss: The recommended weight loss for caustic scouring is 3-8%, but in practice it is around 8-12% which means an excessive loss of fabric weight unnecessarily. The factory has to pay extra money for this unavoidable fabric loss which should not be accepted.

Dye loss: Said earlier that caustic works on swelling method by which all the necessary and unnecessary particles are removed from cotton fiber and most importantly it damages the actual structure of cotton fiber which inspires the dye molecules not to fix according to our requirements and it causes a significant amount of dye loss.

Energy and time concern: In caustic scouring it takes around 105°C temperature and to raise the temperature at this degree it requires a huge amount of energy on which sector we are struggling. Not only has that to raise and lower this temperature and also for several rinsing it takes more time which reduced the productivity.

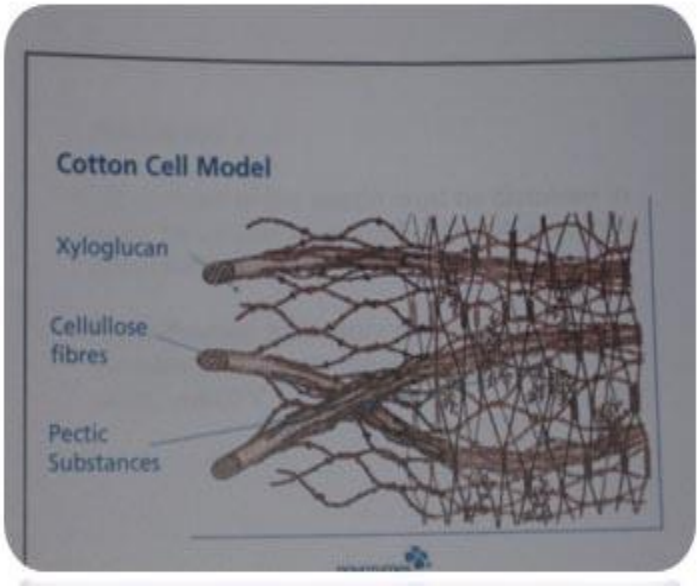
Rinsing and neutralization: In caustic scouring several rinsing steps are practiced which increase the demand of amount of water volume and as this process is carried out at a high pH range (12-14), it needs to neutralize the scouring bath for the processes ahead.

Effluent concern: A lot of harsh chemicals are used in traditional scouring process which is very much responsible to increase the amount of BOD, COD and TDS in the effluent water and increase the unwanted pressure on environment. Caustic scouring is responsible for the lion parts of the total effluent of a factory. It produces -----

- 54% to the total BOD
- 49% to the total COD
- 10-20% of the total pollution load generated during entire textile processing operation.

Risk in chemical handling: The handling of harsh chemicals increase the possibilities of accident and most importantly the longevity of the workers are badly affected by the handling of this harsh chemicals.

Mechanism involved in Bio-Scouring:



The following two stages mechanisms are involved in bio scouring---

Stage 1:

- Removal of wax (a major part being fatty acids, alcohols and esters) is the critical factor for improved wet ability. Pectin functions as a 'glue' binding wax to the fiber. Pectin removal does not by itself result in wax removal or improved wet ability but it renders wax extractable or emulsifiable.
- Presence of Ca++ slows down the removal pectin and fatty acid, so a sequestrate should, if compatible, be applied with the enzyme – otherwise after the enzyme reaction.

Stage 2:

- 2/3 or more of the pectin must be dissolved in order to be able to emulsify enough wax for a good wet ability for dyeing.
- Emulsification is strongly enhanced at temperatures above the wax melting point, i.e. >70°C

Bio-Scouring Process:

Important process parameters:

- pH and Temperature
- Wetteners
- Emulsifiers
- Pectinase enzyme

Application process:

For Bio- Scouring of cotton fabric Scourzyme L of Novozymes is used as sample which is an alkaline pectinase and it removes pectin and other impurities from the primary cell wall of the cotton fibers without any degradation of cellulose.

Equipment: Any type of dyeing m/c used in textile wet processing

Recipe:

Wetting agent	**: 0.5-1.0 g/l**
Buffer	**: pH (7.5-8.5)**
Scourzyme	**: 0.4-0.6% owf**
Emulsion	**: 0.5-1.0 g/l**
Temperature	**: 55°C**
Time	**: 30 min**

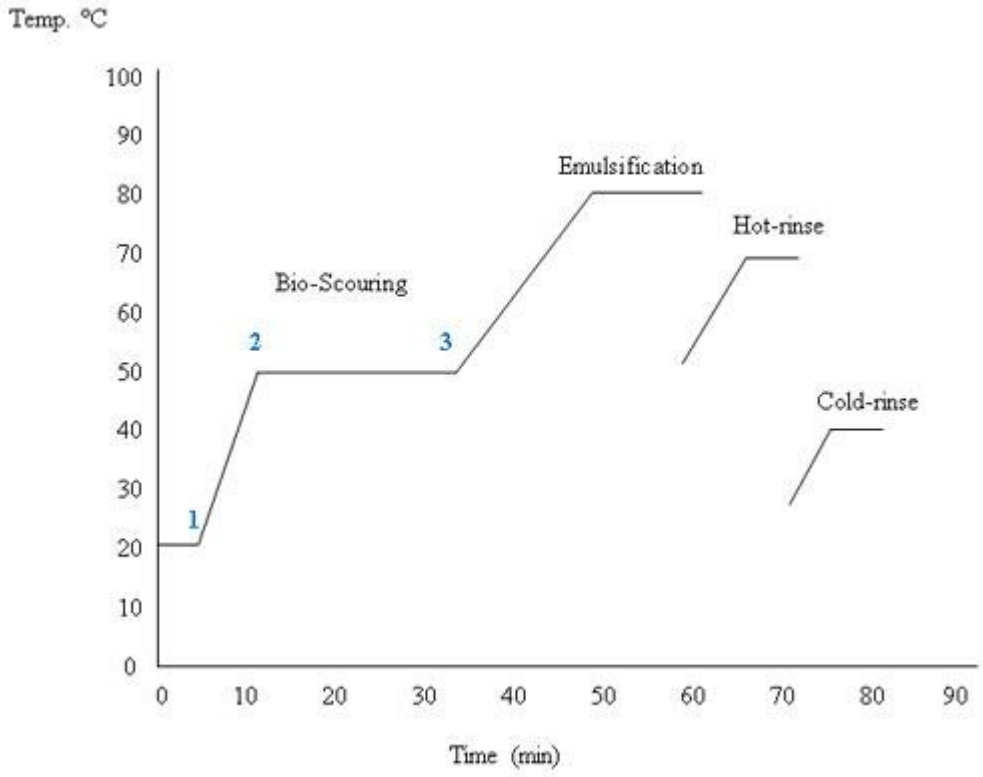


Fig: Bio-Scouring with Scourzyme L on knitted fabric

Advantages of Bio-Scouring over Traditional scouring:

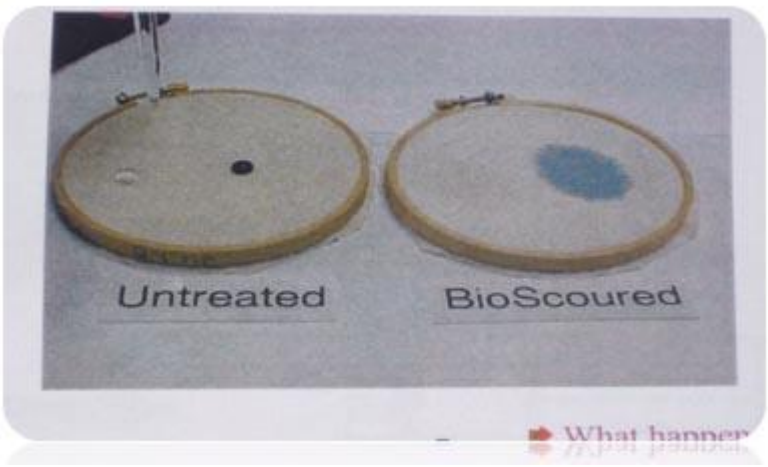
The advantages of bio scouring comparing to traditional scouring can be found in all of the following perspectives----

- Quality perspective
- Economic perspective
- Environmental perspective

Quality perspective: It has been described earlier that the main objectives of scouring are—

- To get the adequate absorbency for further subsequent processes
- To get the minimum degree of whiteness for medium to dark shades and

Maximum degree of whiteness for light and white shades.



Treatment	Absorbency (time)
Scourzyme L (0.4%)	3 sec.
Scourzyme L (0.5%)	2 sec.
Scourzyme L (0.6%)	1 sec.
Caustic scouring	1 sec.

Degree of whiteness:

The whiteness found after bio scouring is quite satisfactory for medium to dark shade but for light and white shade the result is below the satisfaction limit.

Except the above direct qualitative measure of bio scouring, it adds some supplementary quality to the dyed and finished fabric---

- Level dyeing
- Soft feeling
- No strength loss

Economic perspective:

Bio scouring process is very much economical and cost effective comparing to traditional scouring. By considering the following parameters for cost analysis it is found that this process reduces 10-20% of total annual cost which adds a significant amount of profit to the company's annual turnover.

- Less chemical cost
- Energy saving
- Time saving
- Less water consumption
- Less weight loss of fabric
- Less dye loss
- Less effluent treatment cost

Conventional Vs. Bio-Scouring:

Conventional	Bio-Scouring
Process carried out at high tern-perature and pressure for 4-6 hours	Process carried out at ambient temperature and
Process is energy intensive	Low energy process
Residual alkali in effluent is high	Residual alkali is negligible
Water consumption in the process is	Water consumption in the process is

Testing of scouring effect:

Successful scouring ensures the better dye absorption into fabric .It can be assessed in different ways. In practice, estimation of scouring effect can be carried out one of the following tests:

1. Measurement of weight loss.
2. Absorbency test.
    - Immersion test
    - Drop test
    - Wicking test.

1. Measurement of weight loss:

During scouring textile fibers loss a remarkable amount of impurities (oils, fats, waxes etc). Thus the textile goods loss some weight respect to removed impurities. The scouring effect can be evaluated based on this weight loss of fibre. Usually it is calculated from the difference of un-scoured and scoured sample weight at the same moisture content, and then it is measured in percentage.

%Weight loss of sample = (sample weight before scouring – sample weight after scouring)/ sample weight before scouring * 100.

Results:

- Standard wt. loss 4 – 8%.

- For less than 4% wt. loss.
    - Not scoured well.
    - For dark shade full scouring isn't essential so here wt. loss is 4%.

- For above 8% wt. loss.
    - Fiber damage happens.
    - Full scouring for light shade fabric.

2. Absorbency Test:

A. Immersion test –

After scouring, absorbency of the fabric is increased significantly a scoured sample will take less time to be immersed into water than an un-scoured sample. A predetermined sample (1cm * 1cm sized) is put gently on the surface of fresh water. Then the time in seconds is recorded by a stopwatch for submerge the sample into water.

Results:

The standard time for immersion is 5 second and up to 10 second is acceptable.

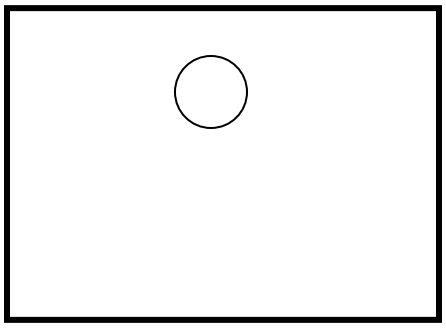
B. Drop test –

This test is very popular and easy to execute within a short tine. In this method, a 0.1% direct red solution is used. A drop of the dye solution is taken by a pipette or glass rod and put softly onto the sample surface. The nature of the absorption is observed carefully. Two thinks should be considered –

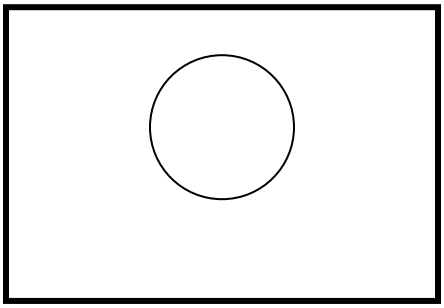
- The time for absorption the drop.
- The shape of the absorbed area on the sample surface.

Results:

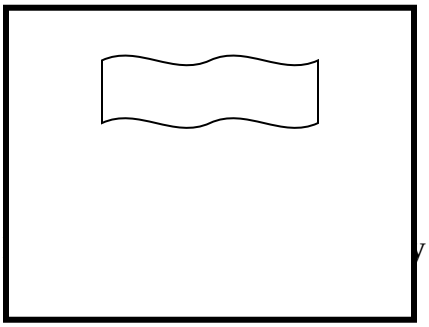
a. A standard scoured sample will take 0.5- 1.0 sec for absorption of the drop.
b. If the absorbed area forms a uniform circle and less area of spreading- indicates even but incomplete scouring.



c. If the absorbed area forms a bigger and uniform circle – indicates even and complete scouring.

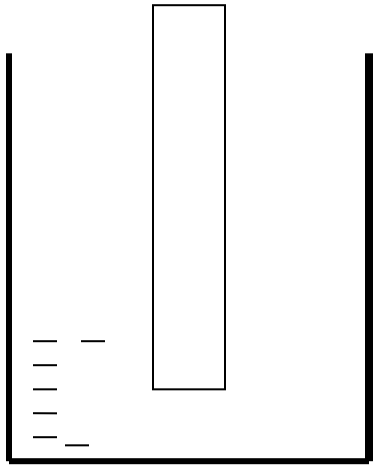


d. If the spot shapes are irregular- indicates uneven scouring.



C. Wicking test –

It’s a very reliable test for measuring the scouring effect. A predetermined sample (18cm * 5cm sized) and standard dye solution (0.1% direct dye) is taken to perform the test. A mark is drawn at 1 cm above from the sample bottom. Then the sample is hung from a stick and immerses the sample in the dye solution up to 1cm mark. Hold the sample for 5 minutes in this position. The dye solution is absorbed by the sample and climb upward direction.



Results:

- Acceptable absorbing length is 30 – 50 mm.
- 30 mm absorbing length means the acceptable lower limit of scouring.
- 40 – 45 mm absorbing length means good/ very good scouring.
- 50 mm absorbing length means excellent scouring.

CHAPTER-03

Experimental Technique and Methodology

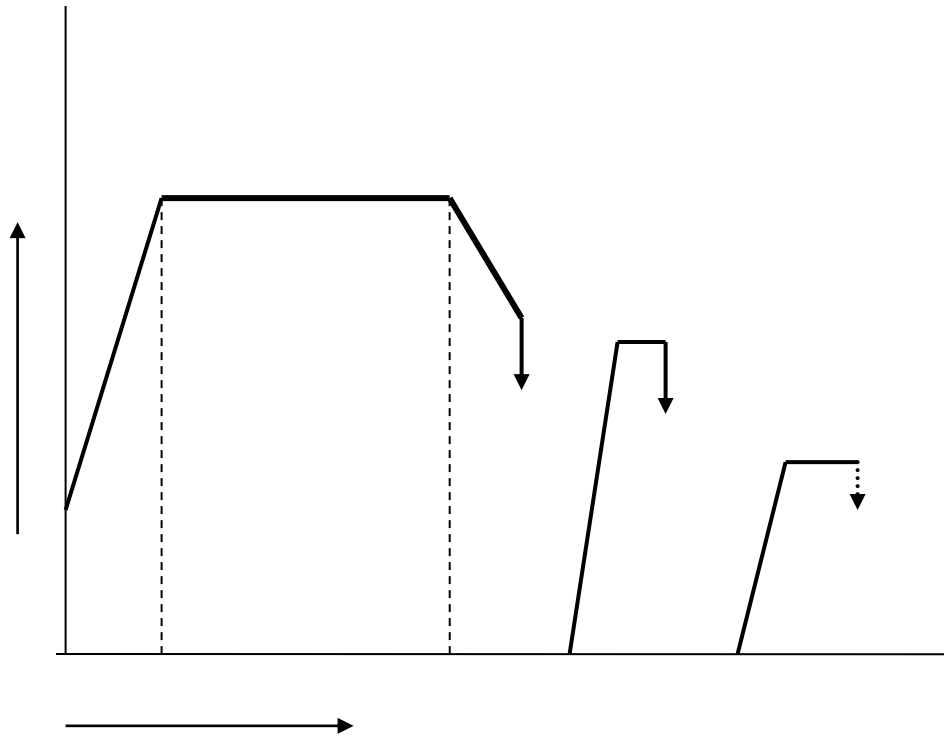
Methods and Materials:

Scouring process:

Typical recipe –

Wetting Agent	:	1 g/l
Detergent	:	1 g/l
Caustic Soda (NaOH)	:	2 g/l
Sequestering agent	:	2 g/l
M: L	:	1: 30
Temperature	:	95-100° C
Time	:	45 min
PH	:	10.5-11.

Curve:



Procedure:

- Set the bath with substrate at room temperature with wetting agent, Sequestering agent and detergent.

- Add alkalis and raise the temperature to 95-100° C & 2-3min.
- Run the bath for 15-45minutes.
- Cool down the bath temperature to 70-80°C and drop.
- Rinse twice with hot (around 70°C) and cold water.

- Neutralize with acetic acid treatment or carry out next process.

Equipment: Any type of dyeing m/c used in textile wet processing.

Sample attaches:

Calculation:

Fabric weight – 10gm

L: M – 1:30

Total liquor – 300cc

We calculate the amount of chemicals by the following way –

For Wetting Agent,

$$= \frac{\text{Recipe amount} * \text{Total liquor}}{1000}$$

$$= \frac{1 * 300}{1000}$$

=0.30cc

In this way, we calculate another chemical.

Detergent = 0.30cc

Sequestering agent = 0.6cc

Caustic Soda = 0.6cc

Water = 300-(0.30+0.30+0.6+0.6)

=298.2cc

Bio-Scouring process:

Recipe:-

Wetting agent	: 0.5 gm/l.
Scourzyme L	: 1.5 %.
Detergent	: 0.5 gm/l.
Sequestering agent	: 0.25 gm/l.
Buffer	: 2 ml/l.
Temperature	: 98°C.
Time	: 30 min.
Emulsion	: 0.5 gm/l.

Curve:-

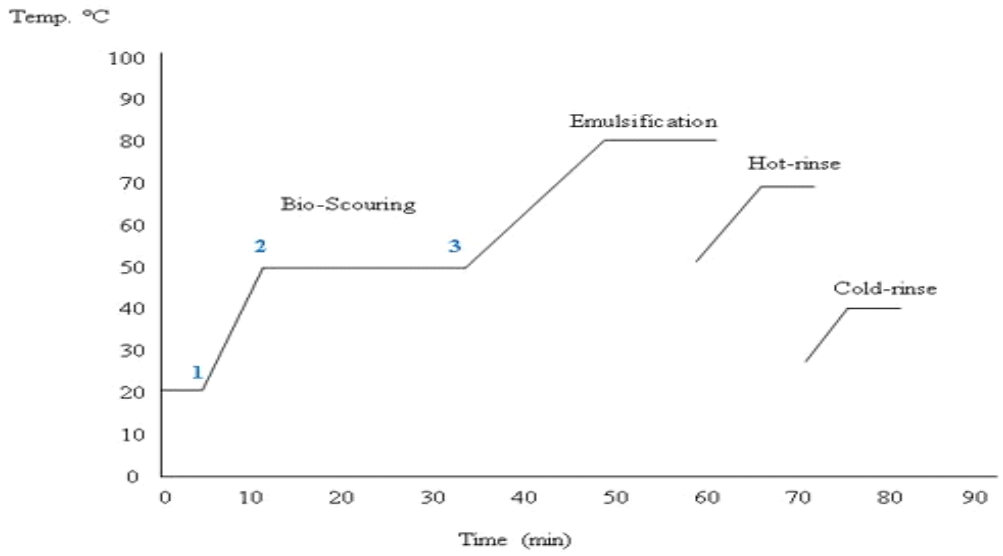


Fig: Bio-Scouring with Scourzyme L on knitted fabric

Calculation:

Fabric weight – 10gm

L: M – 1:30

Total liquor – 300cc

We calculate the amount of chemicals by the following way –

For Wetting Agent,

$$= \frac{\text{Recipe amount} * \text{Total liquor}}{1000}$$

$$= \frac{0.5 * 300}{1000}$$

=0.15cc

In this way, we calculate another chemical.

Detergent = 0.15cc

Sequestering agent = 0.07cc

Buffer = 0.6cc

Scourzyme L = 0.45cc

Emulsion = 0.15cc

Water = 300-(0.15+0.07+0.45+0.15+0.6)

=298.58cc

Procedure

- At first we took the sample and all chemicals at a calculated amount.
- Then we prepared the bath.
- Then the sample and chemicals are taken in the bath.
- The temperature set at 40°C and kept it about 15 minutes
- Then the Bio-Scouring agent, Ammonia buffer are added to the bath
- The temperature rises at 98°C , kept it for 30 minutes
- Then we took the sample from the bath and washed with detergent with 80°C for 5 minutes
- Then the sample is rinsed

Sample attaches:

CHAPTER-04

Results and discussion

Results and Discussion:

Energy saving:

Traditional Scouring	Bio - Scouring	Temp. Saving
105°C	55°C	45%

Time saving:

Parameter	Traditional Scouring	Bio - Scouring
Time (Appx)	4 Hour	1hour 30min

Less Water Consumption:

Parameter	Traditional Scouring	Bio - Scouring
Rinsing(Appx)	4 times	2 times

Less chemical cost:

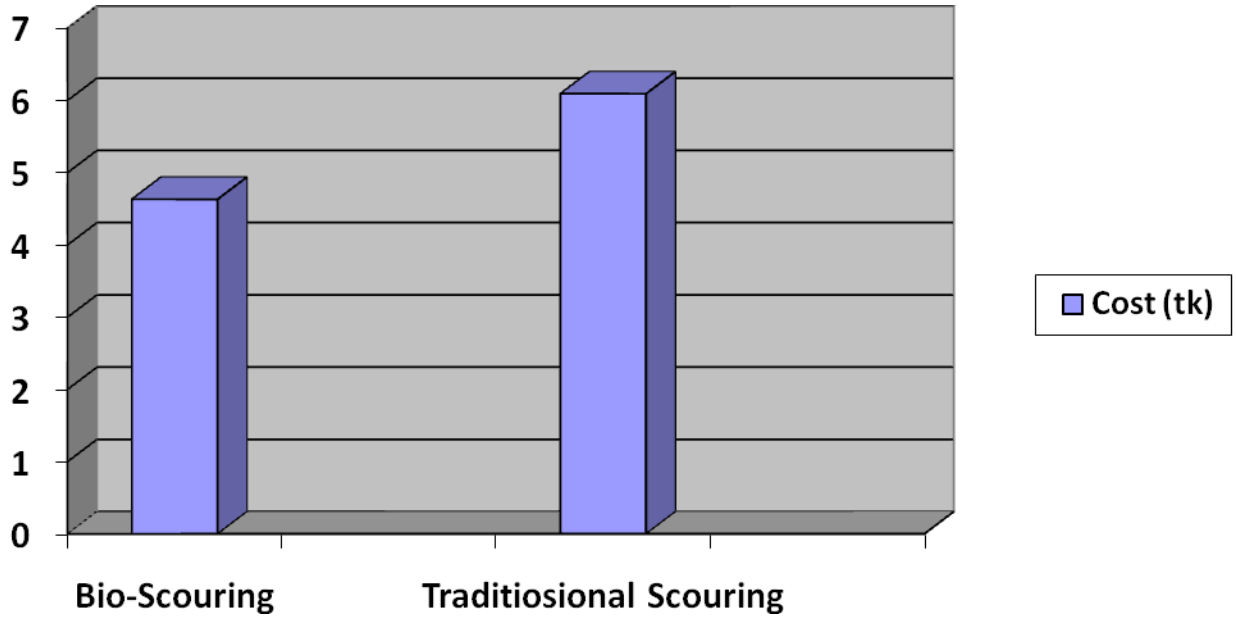
Cost of Traditional Scouring:

Chemicals	%, g/l	Rate	Qty/100 kg fabric	Cost/100 kg fabric
Sequestering agent	0.3	207	0.24	49.68
Detergent	0.5	112	0.4	44.80
Caustic Soda	3.0	38	2.4	91.20
Stabilizer	0.3	107	0.24	25.68
Hydrogen Peroxide	2.5	42.88	2.0	85.76
Hydrogen Peroxide Killer	0.1	235	0.08	18.80
Acetic Acid	1.0	60.5	0.8	48.40
			Total Cost	**608.50**
			Cost/kg	**6.09**

Cost of Bio-Scouring:

Chemicals	%, g/l	Rate	Qty/100 kg fabric	Cost/100 kg fabric
Soda Ash	0.4	27.67	0.32	8.85
Scouring enzyme	0.8	258	0.64	165.12
Jet	0.7	235	0.56	131.6
Detergents	0.5	112	0.40	44.8
			Total Cost	**462.94**
			Cost/kg	**4.63**

Graphical representation cost of Bio-Scouring and Traditional Scouring:



Less Effluent Cost:

Norms of discharged Water	After traditional scouring	After bio scouring	Reduction (%)	Total Cost Reduction (%)
pH	9.78	7.16	26.78	
BOD	215	58	73.12	
COD	283	179	36.74	**31.55**
TDS	1361	1317	3.23	
TSS	13	12	13.3	

Environmental Perspective:

The norms of discharged water after dyeing with traditional scouring and bio scouring can be furnished by the following way. It is an approximate data of Northern Corporation.

Norms of discharged Water	After traditional scouring	After bio scouring	Reduction (%)
pH	9.78	7.16	26.78
BOD	215	58	73.12

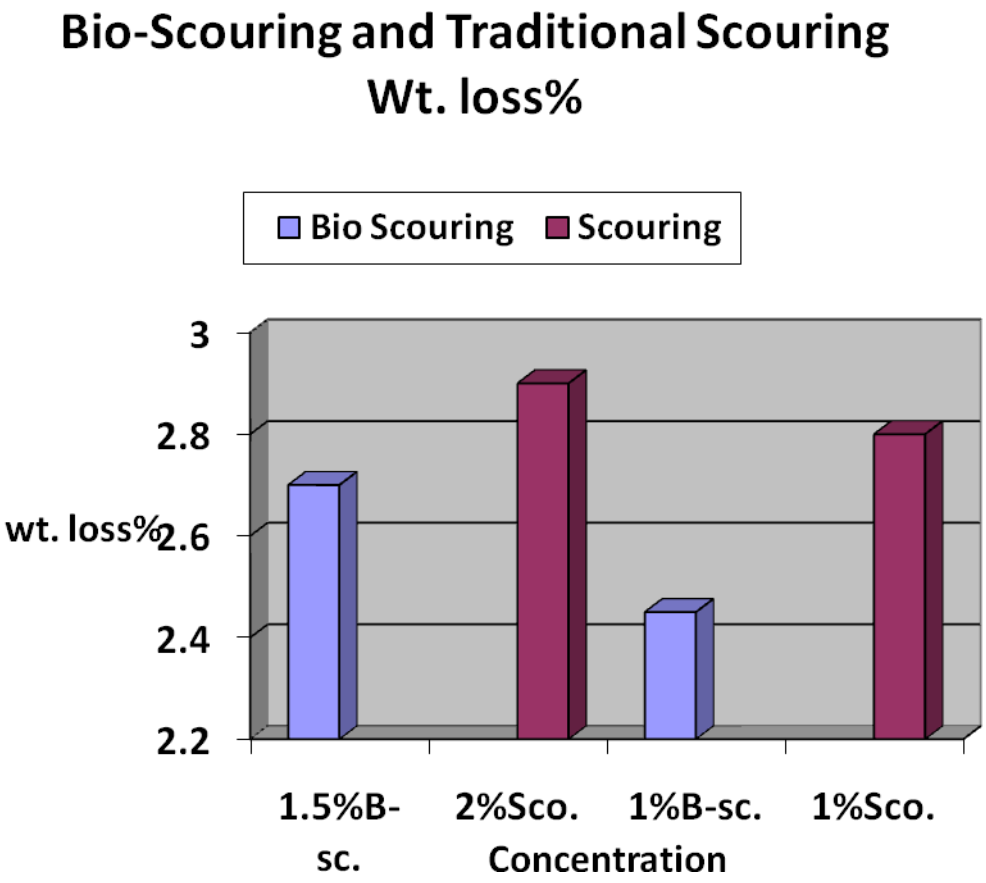
Table: 01 Variation in concern for bio-scouring (weight loss %)

Sample No	Concentration Of (Bio-Scouring)	pH	Temp. ‘c	Weight (gm) (before)	Weight (gm) (after)	Weight Loss in (gm)	Weight Loss%
1	1.5%	7-8.5	98’c	10	9.73	0.27	2.7%
2	1%	7-8.5	98’c	10	9.75	0.25	2.5%

Traditional Scouring (Weight loss %)

Sample No	Concentration Of NaoH	pH	Temp ‘c	Weight (gm) (before)	Weight (gm) (after)	Weight Loss in (gm)	Weight Loss%
1	2%	10.5-11	130’c	10	9.71	0.29	2.9%
2	1%	10.5-11	130’c	10	9.72	0.28	2.8%

Graphical representation of weight loss% with respect to concentration:



From the above graphical representation, it is seen that, when the fabric is treated with the concentration of Bio – Scouring agent, 1.5% & 1% then weight loss of fabric is 2.7%&2.5%. On the same way when fabric is treated at the concentration of Scouring agent, 2% &1% then weight loss of fabric is 2.9& 2.8%.These result decided that which means an excessive loss of fabric weight unnecessarily in Traditional Scouring

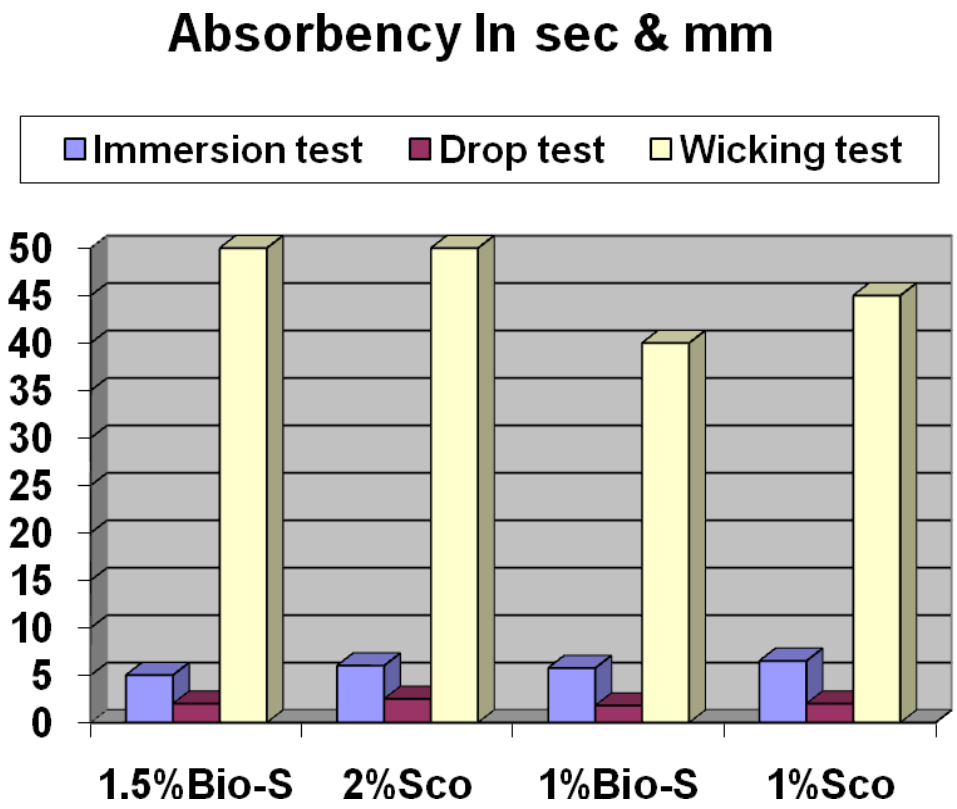
Table: 02 (Variation in concentration) for bio-scouring (Absorbency Test):

Sample no	Concentrate Of Bio-Scouring	pH	Temp 'c	Absorbency		
				Immersion Test (in Sec)	Drop test (in Sec)	Wicking Test (in mm)
1	1.5%	7.5-8.5	103’c	5	2	50
2	1%	7.5-8.5	103’c	5.75	1.8	40

Traditional scouring (absorbency Test)

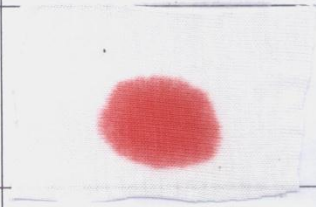
Sample no	Concentrate Of NAOH	pH	Temp 'c	Absorbency		
				Immersion Test (in Sec)	Drop test (in Sec)	Wicking Test (in mm)
1	2%	10.5-11.5	103’c	6	2.5	50
2	1%	10.5-11.5	103’c	6.5	2	45

Graphical representation of (Absorbency Test) for Bio – Scouring and Traditional Scouring:



Samples for Bio – Scouring and Traditional Scouring Treatment (Absorbency test):

Drop Test:

Sample No.	Bio – Scouring	Traditional Scouring
01.		
02.		

Samples for Bio – Scouring and Traditional Scouring Treatment (Absorbency test):

Winking Test:

Sample No.	Bio – Scouring
01.	
02.	
	Traditional Scouring
01.	
02.	

Color fastness test:

Dyeing recipe:

Reactive Red	– 4%
Reactive Blue	– 3%
Leveling Agent	- 1gm/l
Salt	- 80gm/l
Soda	- 20gm/l
T: M	- 1:50
Time	- 50min
Temp.	- 90°C

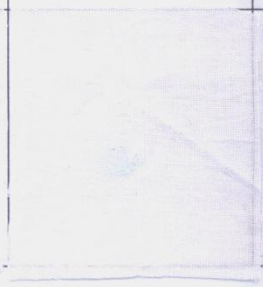
Procedure:

- At first we took the sample and all chemicals at a calculated amount.
- Then we prepared the bath.
- Then the sample and chemicals are taken in the bath.
- When Dye bath temperature raised at 50°C dye solution is added in dye bath.
- When Dye bath temperature raised at 60°C salt and dye are added the bath.
- Soda ash added in the dye bath at 90°C temperature, run time 30 min.
- After dyeing process the fabric is wash to hot water.
- At last drying the fabric.

Bio – Scouring and Traditional Scouring Treatment (Rubbing Fastness test):

Bio – Scouring		Traditional Scouring	
Dry	Wet	Dry	Wet
4-5	3-4	4	3

Samples for Bio – Scouring and Traditional Scouring Treatment (Rubbing Fastness test):

Bio – Scouring		Traditional Scouring	
Dry	Wet	Dry	Wet
			

Samples for Bio – Scouring and Traditional Scouring Treatment (Wash Fastness test):

Process recipe:

Detergent : 4gm/l

Soda ash : 1gm/l

M: L : 1:50

Time : 30-40min

Temperature : 60°C

Table Content:

Bio – Scouring	Traditional Scouring

CHAPTER-05

Conclusion

Conclusion:

Bio-Scouring process is also called Eco-friendly Scouring. This process is applied to cellulose textiles that produce permanent effects by the use of enzymes. Bio-Scouring removes protruding fibers and slobs from fabric by the use of enzymes. Significantly reduces softness fabric hand and provides a smooth fabric appearance, with high whiteness especially for knitwear.

The best result is obtained at 3% concentration of enzyme where M: L ratio sustains 1:30.Enzyme shows maximum activity at PH range of 4-5 and the temperature of 98°**C**. Mechanical agitation also supports enzyme activity .Wash fastness at the enzyme treated sample before dyeing is very poor but after dyeing is very good. Lastly we can say that this is a very important topic through which we have learned more about Bio-Scouring treatment.

CHAPTER-06

Appendixes

Reference:

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www.biotech.about.com

www.ecofrendly tex.com

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www.scouring.com

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Practice of Textile Coloration (Vol-1)

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THE END