

Saraquest

Exclusive Insight



Chemistry Behind Good Feelings

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Table of Contents

01	Sarakol-BSI 353 - Anti Back Staining Agent	03 - 05
02	Indofix-641 - Indigo Dye Fixing Agent	06 - 08
03	Flamguard-DPS. - Flame Retardants for Synthetics	09 - 11

SARAKOL-BSI 353

Anti Back Staining Agent



Denim as a fabric, has received the widest acceptance among all textile products. It has had an incredible influence on consumers, both socially and culturally. Denim garments are looked at as a major trend setter by our youth. The spread of denim culture all over the world brought with it a trend of fast changing fashions. This twill cotton fabric usually has warp threads indigo dyed while weft remains plain white. The warp faced fabric therefore looks blue on one side and white on reverse. The warp being ring dyed, creates denim's fading characteristics, which is unique compared to every other textile material. With changing times, many new variants of denim came into existence. Denim washing is one of the key areas in getting the faded look. One after another several washes were introduced such as stone wash, acid wash, moon wash, etc. Earlier, stone washing used to be done to achieve soft feel and the desired appearance. As per the denim garment export market, this high quality garment has superior aesthetics and great value for price. During washing, the pumice stone scraps off the dye particles from the yarn surface in the denim fabric. Difficulty in removing residual pumice from fabric, damage to equipment and clogging of machine drainage passage due to particulate material proved to be major drawbacks with the technique. Later on, use of enzymes became a sustainable option to get the worn out look in denim. The enzymes used are cellulase enzymes, specifically acting on the cellulose part, mainly on the surface of the fabric.

This gives the desired look and at the same time, removes hairiness from surface thus giving a smooth and soft feel.

The cellulase enzyme hydrolytically degrades the cellulose part until it becomes glucose. This glucose is partially able to reduce the indigo, both on the fibre and in the treatment liquor. This reduced form has low affinity to cellulose fibre and thus soils the weft thread and the pocket lining / back staining.

In terms of the quality aspect, back staining plays a vital role in improving the appearance of the denim garment. Back staining implies soiling of the weft thread and the pocket lining by detached indigo or its reduced leuco form. Back staining mainly occurs during desizing or stone washing or enzyme stone washing. Denim and its various items like pants, shirts, jackets, belts, caps, etc, are the most preferred clothing for today's youth. This study discusses about the performance of Sarakol-BSI 353 in reducing or preventing back staining of indigo dyes on the weft yarn and pocket of denim garments.

Mechanism:

During stone washing the cellulose is degraded hydrolytically and during enzyme treatment by cellulase enzyme cellulose is degraded partially until it becomes glucose.

The glucose is partially able to reduce the indigo, both on the fibre and in the treatment liquor. This reduced form has low affinity to cellulose fibre and thus soils the weft thread and the pocket lining.

In order to avoid such back staining which will reduce the garment value in the world market, some anti back staining agents are used in the wash bath. Sarex have developed Anti back staining agents viz., Sarakol-BSI 353 and Sarakol-BSI 867. These agents are added in the bath along with other chemicals associated with the respective washes. These agents are the ones capable of prohibiting the action wherein the removed dyes re-deposit themselves on the garment.

Unique Features of Sarakol-BSI 353 & Sarakol-BSI 867:

- Anti back staining agents for denim garments available in powder form.

- Prevents re-deposition of indigo on garment, particularly labels and pockets in denim garment, during processing.
- It produces salt pepper effect when combined with cellulase enzyme in denim fading.
- Can be added in desizing as well as bio-polishing of denim garments.
- Anti back staining, excellent dispersing and anti re-deposition action.
- Prevents staining of labels and pockets in denim garment.

Application:

Desizing → Bio polishing:

Desizing: 0.2% Celldet-R + 0.3% Desize-GC + 0.5% Sarakol-BSI 353

pH 5.5, M:L - 1:10, Temp. - 40°C, Time - 10 min → Cold Wash → Squeeze → Bio-polishing

Bio polishing: 1% Biopol-HC + 0.5% Celldet-R + 0.5% Sarakol-BSI 353

Results:

Laboratory Trials with Sarakol-BSI 353

Staining on adjacent Polyester / Cotton blend fabric with Indigo Denim fabric



Without Anti-back staining agent



Sarakol-BSI 353



Competitor

Bulk Trials with Sarakol-BSI 353

On Sulphur Dyed Denim



Competitor

Sarakol-BSI 353

On Indigo Dyed Denim



Competitor

Sarakol-BSI 353

Competitor

Sarakol-BSI 353

Conclusion:

Enzymatic treatment carried out in presence of Sarakol-BSI 353 prevents the re-deposition of indigo dye on the denim pockets and they appear to be much cleaner than the competitor product.

INDOFIX-641

Indigo Dye Fixing Agent



The indigo dyeing of cellulosic yarns and fabrics, because of the essentially surface nature of such dyeing, creates a fabric subject to considerable and persistent wash down or loss of colour during extended use. For nearly two decades customer preference and acceptance, particularly in denim fabrics such as jeans and overalls, has been highly favorable to the so-called washed-down look. Often the product was actually prewashed several times by fabric or garment manufacturers to produce the much-sought "used" look. In some instances even one or more chlorine bleaches were employed to achieve a greater appearance of use.

Today the tide of customer and styling preference has swung toward denims more stable to washing, in either home or commercial washing machines. Not only is more wash fastness being sought in jeans and overalls, but denim has been promoted to a high-fashion fabric for use in suiting's, slacks, dresses, and the like. Jeans are also now considered business casual in many creative workplace.

Solutions from Sarex:

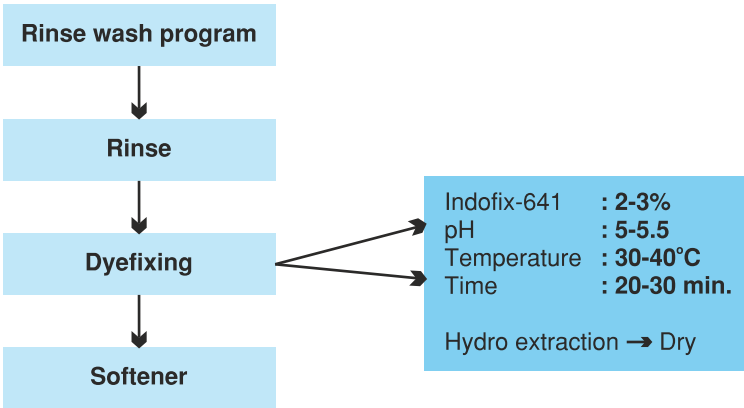
Since high wash down is inherent in indigo-dyed fabrics, a need has thus arisen for improving the washing fastness of such fabrics. Sarex has developed a product Indofix-641 with which the wash fastness of indigo-dyed cellulosic fabrics, more particularly denims, is greatly improved.

Unique Features of Indofix-641:

- It Improves the wet fastness of Indigo dyed substrates.
- Indofix-641 helps to retain depth during stone washing or enzyme treatment and at the same time achieves washed down effect.
- It is formaldehyde free with excellent dye retention property for indigo.
- Treated fabrics or yarns just need to be dried, no need of curing.
- Improve the washability of denim clothing.

Application:

[I] Dye Fixation of Indigo Dyed Denim fabric:



Wash bath of Indofix-641			
Bulk trial		Lab trial	
Untreated fabric	3% Indofix-641	Untreated fabric	3% Indofix-641

Colour fastness to Washing - ISO 105 C10							
Dyed fabric	Staining on Multifibre						
	WO	PAN	PES	PA	CO	ACE	
							Unfinished fabric
							Treated with 3% Indofix-641

ACE : Acetate, CO : Cotton, PA : Nylon, PES : Polyester, PAN : Acrylic, WO : Wool

The above results are taken from lab trial and bulk trial. As clearly seen from the photograph that there is no bleeding of dyestuff from the Indofix-641 treated fabric.

[II] Dye fixing treatment followed by Enzymatic treatment to obtain Puckering effect:

Indofix-641 : 2-3%
Bath pH : 5-5.5
Temperature : 30-40°C
Time : 15-20 min.

After dye fixing, drain the bath and subject the garment for enzymatic treatment.

Neutrazyme-570 : 1-1.5%
Temperature : 30-40°C
Time : 45 min.

Drain the bath
Hydro extraction → Dry

**Neutrazyme-570: Cost effective Neutral Cellulase Enzyme*

Bulk trial : Indofix-641 followed by Enzymatic treatment to obtain Puckering effect



Conclusion:

Indofix-641 will help to increase the wash fastness of the indigo dyed denim fabric by forming an electrovalent bond with anionic dyes and thus increasing the molecular size of the dye and making it insoluble in water. Indofix-641 treatment also considerably reduces the back staining of denim garments.

FLAMGUARD-DPS.

Flame Retardants for Synthetics



Flame retardants are materials that have an ability of inhibiting or resisting the spread of fire. Textiles are extremely flammable and contribute to rapid fire spread. However, the ignitable property of a textile can be considerably reduced by any one of the three methods- by using inorganic materials such as Asbestos, Glass etc; by chemically treating the textile with Flame Retardant chemicals; or by modifying the polymer. Today, flame retardant fabrics are finding importance across all industrial and commercial workspaces, with workers working in direct contact with sparks, flame, fire etc. These could be uniforms for firefighting agents or workers of foundries, welding places, automotive, engineering industries, etc. wherein fire retardant fabric will find increased usage and application in automotive textiles.

The purpose of flame retardant is to impart resistance on the substrate to flame and protect human lives from injuries. There has been some developments in flame retardant finishes for polyester fabric and its blends. Flame retardant finishes for synthetic fibres should either promote char formation by reducing the thermo plasticity or enhance melt dripping so that the drops can be extinguish away from the igniting flame.

Flame retardant chemicals that are applied to fabrics are intended to inhibit or suppress the combustion process. These fire retardants interfere with combustion at different stages of the process like during heating, decomposition, ignition or spreading of flame.

Now, if the textile is flame resistant then the flame retardant can act physically and/or chemically by interfering at particular stages of burning. There are different mechanisms of flame retardants.

The traditional FR chemicals are based on elements such as phosphorus, nitrogen, halogen or water of dehydration. Phosphorus-containing compounds have been proved to be highly effective in conferring flame-retardancy to highly oxygenated polymers. But the best results would be achieved if the FR formulation were relatively water-insoluble long chain polymeric phosphorus compound. Synergism between two or more elements as well as their compounds becomes imperative since the high doses of these substances are undesired due to emission of non-eco-friendly toxic gases during the burning process. It is, therefore, necessary that the least amount of FR chemical present in the substrate must be found that give desired FR properties, while simultaneously protecting the environment.



Considering the responsibility of today's generation and the exigency for protection against fire and its harmful effects on the end user, Sarex has developed flame retardant Flamguard-DPS. for synthetic fibres.

Flamguard-DPS. is durable flame retardant finishing chemical for 100% polyester, polyamide and polypropylene fibres. It is a halogen free compound and fabric finished with Flamguard-DPS. shows minimum effect on shade and posses good fastness to home laundering and dry cleaning. Flamguard-DPS. does not have any effect on the drape of the treated fabric and has low volatility and does not lead to fogging. It is applicable by padding and spray method.

Application Condition:

A 100% polyester and polyamide fabric was finished with Flamguard-DPS. by padding application with 70% expression, dried at 120°C for 2 min and cured at 160°C for 3 min. A 100% polypropylene nonwoven was padded with Flamguard-DPS. keeping 95% expression, dried at 110°C and cured at 130°C.

Test Method:

The finished fabrics were evaluated for flame retardancy as per ASTM D 6413-94. Samples were weighed before being mounted in a frame and then placed in the flame chamber. The methane (C.P. grade) burner flame was adjusted to a height of 1.5" and the specimen set to 0.75" above the burner. The bottom of the specimen was exposed to the flame for 12 s at which point it was observed for melting and dripping behavior. The after-flame time, the length of time for which a material continues to flame after the ignition source has been removed, was recorded. Any afterglow time was recorded ASTM D-2863 Limiting oxygen Index (LOI) Fabric is held vertical in atmosphere of different oxygen/nitrogen ratios and ignited from top. (Determines minimum oxygen level to support combustion).

Results & Discussion:

From Table 1 it is seen that the fabrics treated with 160gpl Flamguard-DPS. shows excellent flame retardancy on 100% Polyester, Polyamide and Polypropylene nonwoven fabrics. It can be also seen that, the after glow time of treated fabric is zero indicating it is not propagating the flame after the flame is withdrawn. The main reason for this flame retardancy action is due to the char-formation combined with foaming, which then forms a protective top layer on the fabric surface. The advantage of such flame retardant is that it causes less release of smoke and off-gases in a developing fire situation, thus keeping secondary fire damage as low as possible.

Durability of treated fabrics were tested after washing the fabric using AATCC-61 2A (accelerated washing) where one wash is equal to five washes and the results are summarized in Table 2. It was seen that all the fabrics treated with flame retardants showed good durability even after 25 home launderings.

Limiting Oxygen Index (LOI) of the polyester fabric treated with Flamguard-DPS. was evaluated, and it was found that the fabric shows higher LOI than the unfinished fabric indicating higher amount of oxygen required for catching fire.

Table 1: Flame Retardancy action of Flamguard-DPS on 100% Polyester, 100% Nylon and 100% Polypropylene fabrics nonwoven

Sr. No.	Fabric	Unfinished		160 gpl Flamguard-DPS.	
		Char Length (cm)	After glow time (sec.)	Char Length (cm)	After glow time (sec.)
1	100% Polyester	Completely burn	-	6.5	0
2	100% Nylon	Completely burn	-	4	0
3	100% Polypropylene Nonwoven	Completely burn	-	3.9	0

Table 2: Durability of Flamguard-DPS. on Polyester & Polyamide Fabric

Sr. No.	Name of Product	160gpl Flamguard-DPS. on Polyester		160gpl Flamguard-DPS. on Polyamide	
		Char Length (cm)	After glow time (sec.)	Char Length (cm)	After glow time (sec.)
1	Unfinished	Completely burn	-	Completely burn	-
2	Initial	7	0	7	0
3	5HL	7.1	0	7.2	0
4	10HL	7.8	0	7.5	0
5	25HL	8.2	0	7.8	0

Table 3: Limiting Oxygen Index results of 100% Polyester fabric

Sample Number	Description	Treated/Untreated	LOI Values
1	100% Polyester	Unfinished	22
2	100% Polyester	100 g/l Flamguard-DPS.	36

Conclusion:

Textiles play an important role in everyday life and one of their main drawbacks refers to their structure, as they are mainly made of organic polymers, which are flammable and potentially dangerous species. Fabrics treated with Sarex flame retardants showed excellent flame retardancy and durability up to 25HL on synthetic fibres. The fabrics treated with these flame retardants showed minimum shade change and also showcased the versatility of being applied during dyeing. The revolution which is imminent in the future in the field of flame retardancy, Sarex is going to play a pivotal role in offering gamut of flame retardants for various substrates, which can pass the test methods required by the customers.

C E R T I F I C A T I O N S



M&S



OHSAS
18001:2007



ISO
17025:2005



ISO
14001:2015



ISO
9001:2015



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GOTS



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